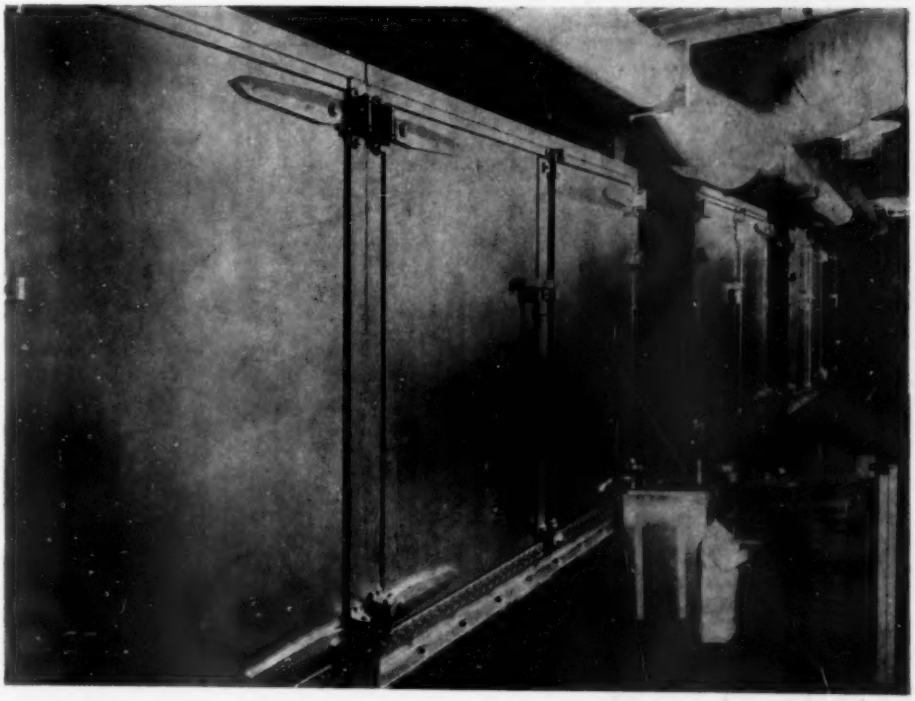
MODERN
REFRIGERATION
AND AIR CONTROL

Vol. 64 No. 756 MARCH, 1961 Price 2s. 6d. monthly

MODERN FREEZING—FAST

More and more attention is being given to the problems of freezing fish at sea on the fishing grounds. Jackstone Froster Limited have done a great deal of research into this problem over the last ten years or more and their wide experience is available regarding the installation of freezing equipment on trawlers and factory ships.

A battery of five multiplate freezing cabinets were installed on factory trawler ships "FAIRTRY II" and "FAIRTRY III". On each vessel the equipment is calculated to give a throughput of 27 tons filleted fish per day. Jackstone multiplate cabinets have doors at front and back to facilitate through loading and easy maintenance and cleaning.



★ ★ ★ ★ ★ ★ ★

Full details of all Jackstone Models for freezing AT SEA or ON LAND are available on request.

Jackstone Froster Ltd.

HUMBER BRIDGE ROAD · GRIMSBY · ENGLAND

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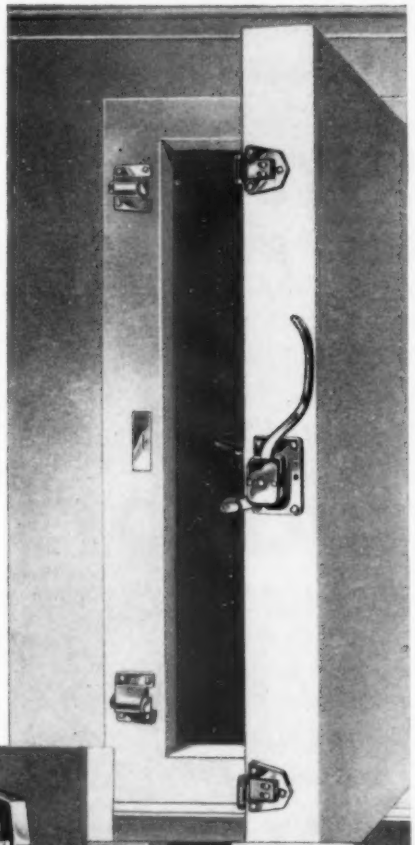
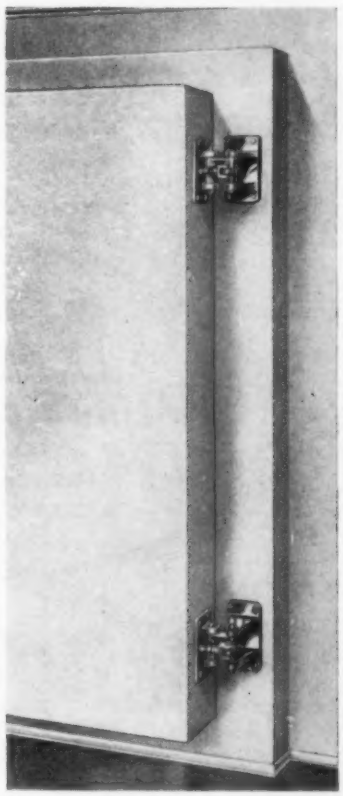
The SUPER-CAS DEEP FREEZE FASTENER

PATENT NO. 840,661



and

"CASKO" ADJUSTABLE BALL BEARING DEEP FREEZE HINGE

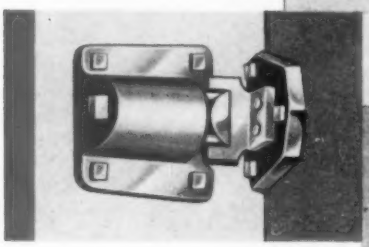


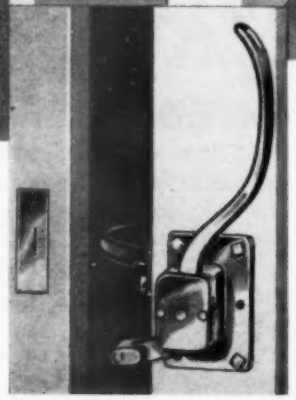
Specialities

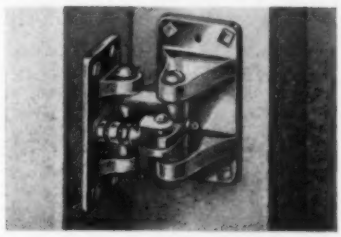
- Van door two point Freezer Door Fasteners
- The "Cassey" Throwover Fastener
- Streamline Fastener
- "Walcas" Fastener
- "Rolcas" Fastener
- "Redmac" Fastener
- "J" Type Fastener
- Roller Bolt Fasteners of all types
- "Casko" Ball Bearing Hinges
- "J" Type Hinges
- Strap Hinges of all types

In Galvanised Malleable Iron or Chrome plated finish on Brass

Catalogues on application







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A	B	C
for Doors from 5½" to 7" thick	for Doors from 7½" to 10" thick	for Doors from 4" thick

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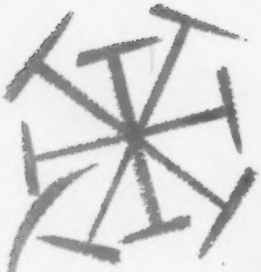

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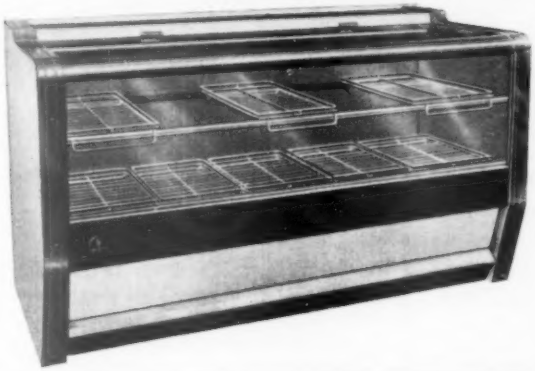

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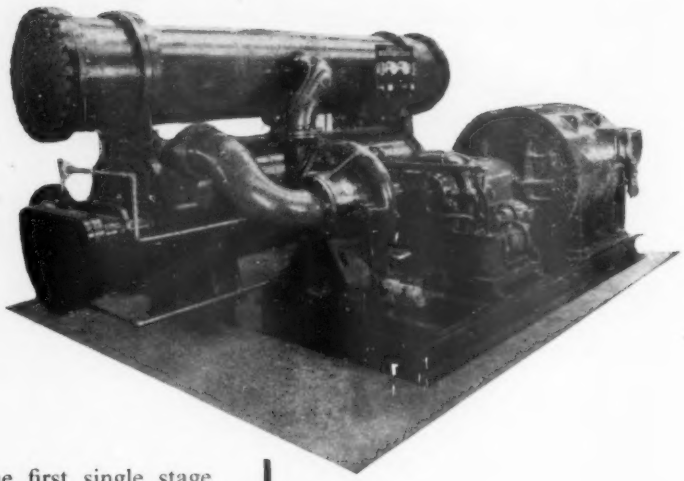
and another first for YORK



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Two entirely self-contained turbo packaged water cooling systems were designed, with special consideration given to the problems arising from insufficient fresh water supplies and the necessity of using sea water for cooling. Each system is rated to cool 875 gallons per minute, which represents a heat removal rate of 4.2 million B.Th.U's per hour.

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P.6039

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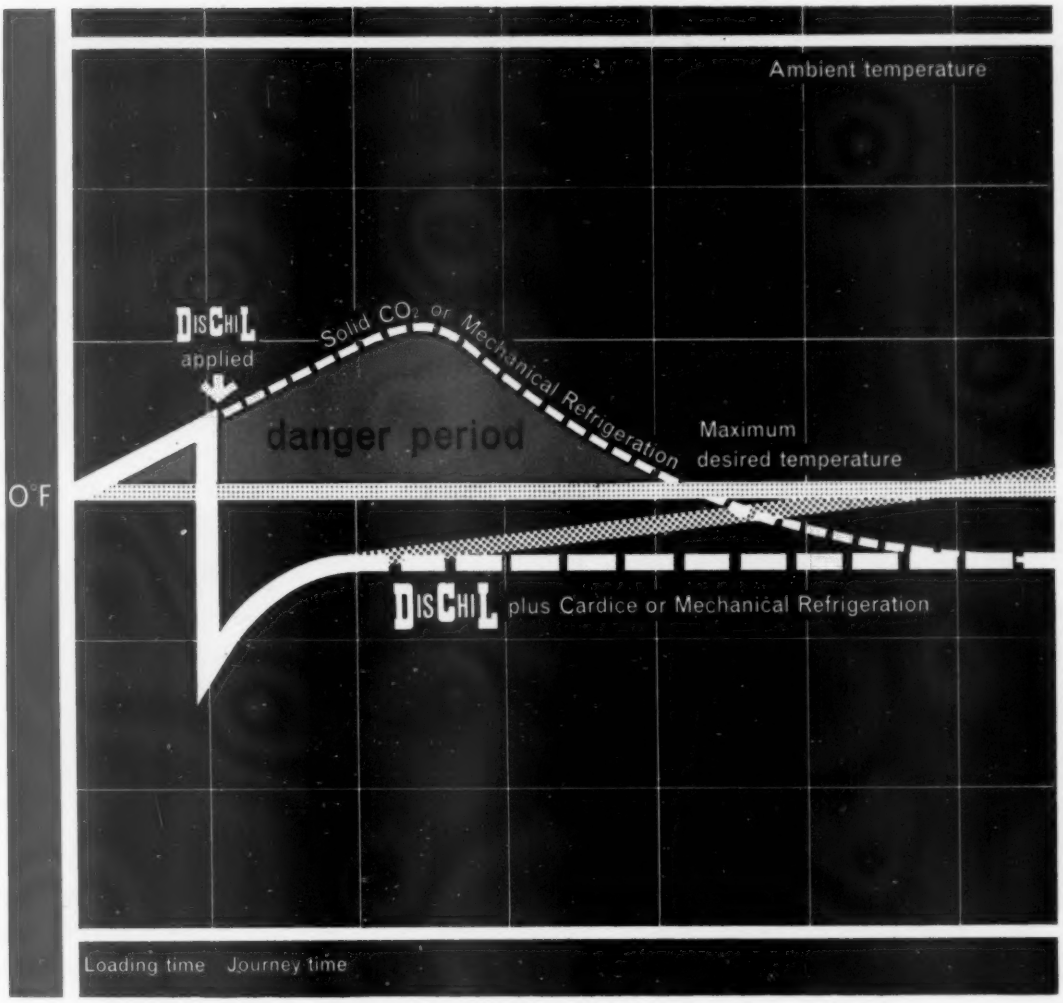

Cut out the danger period. While the container doors are open, the goods and vehicle shell take in heat. The container fills with warm air, bacteria and moisture. Normal systems of refrigeration may take six to eight hours to reduce temperature to the desired level.

DisChiL FOOD PRESERVATION SERVICE

–gives immediate temperature drop

The DisChiL System pulls down the temperature in seconds after loading. The vehicle's own refrigerant has nothing to do but keep it down. If you will write to us, we will be glad to explain in detail.

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EXTERNAL DIMENSION

the same dimensions

in a greater

horse-power range

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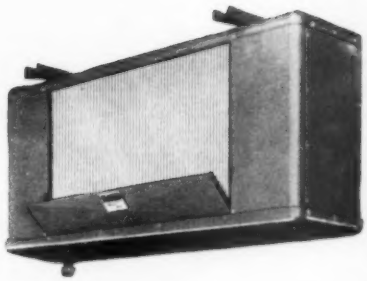

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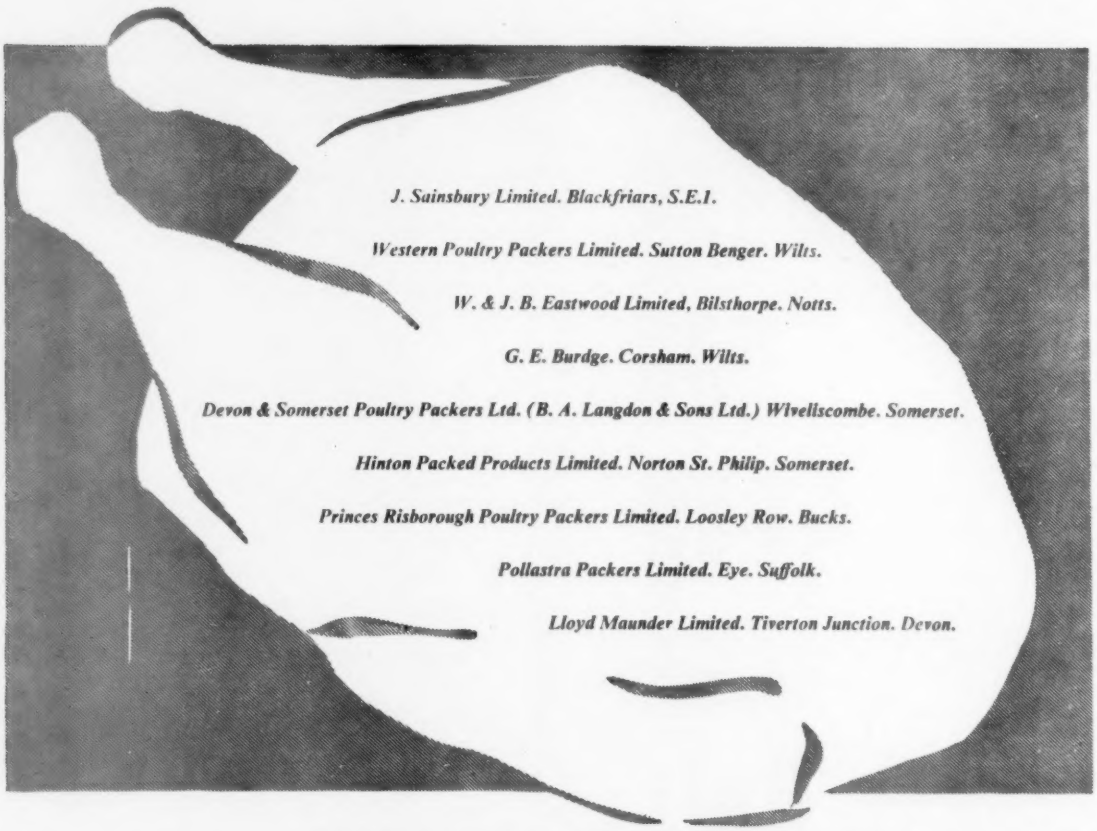
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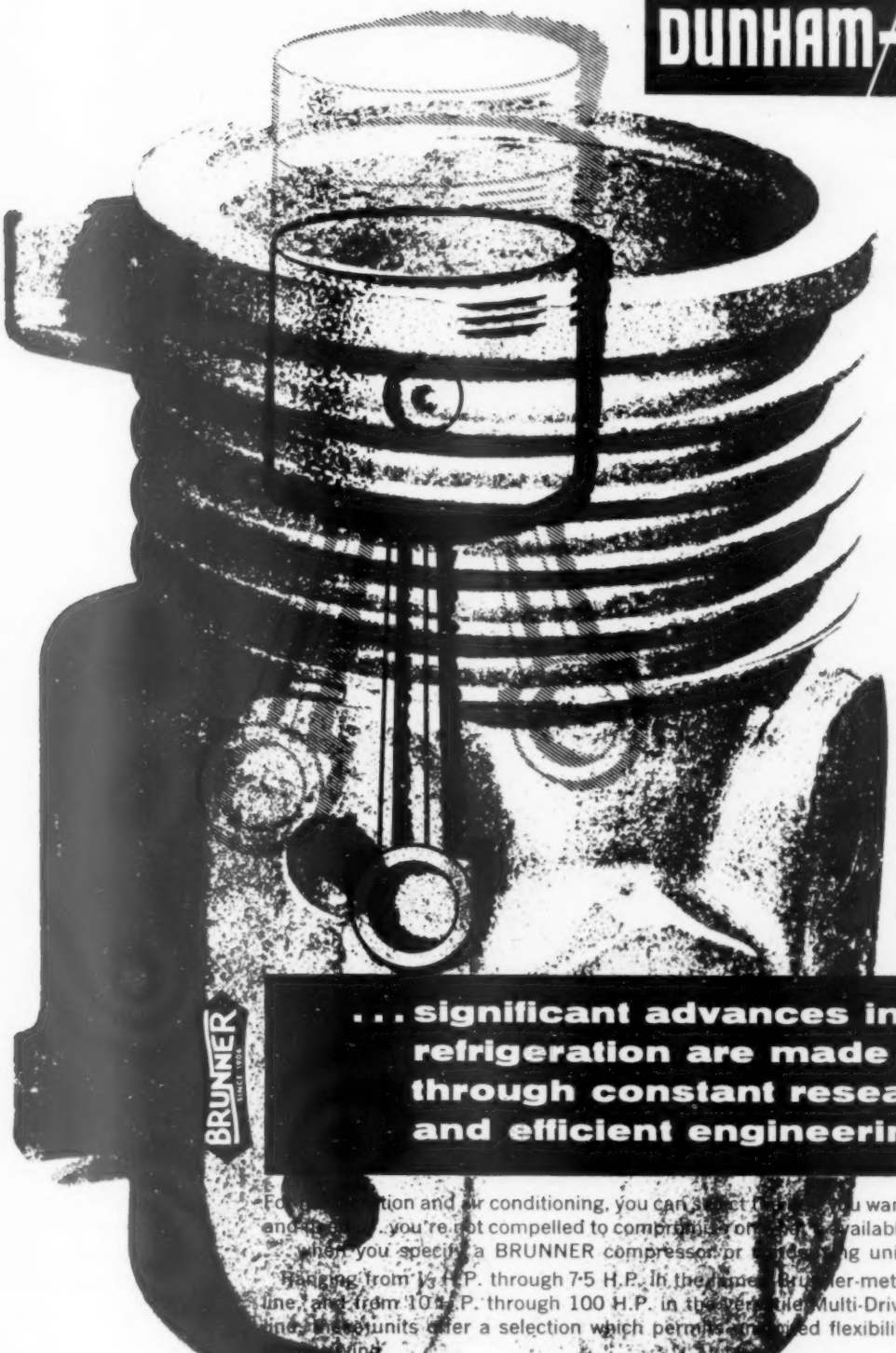

STAND 17
INTERNATIONAL REFRIGERATION AND AIR-CONDITIONING EXHIBITION EARLS COURT
APRIL 11-14

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For [illegible]tion and air conditioning, you can [illegible] u want and [illegible] you're not compelled to compromise [illegible] available when you specify a BRUNNER compressor or [illegible] ng unit. Ranging from ⅓ H.P. through 7·5 H.P. in the [illegible] er-metic line, and from 10 H.P. through 100 H.P. in the [illegible] Multi-Drive line, these units offer a selection which permits [illegible] ed flexibility [illegible] ing.

[illegible] every Brunner product is the [illegible] mind reassurance represented by over 50 years' experience in the design and manufacture of quality compressors.

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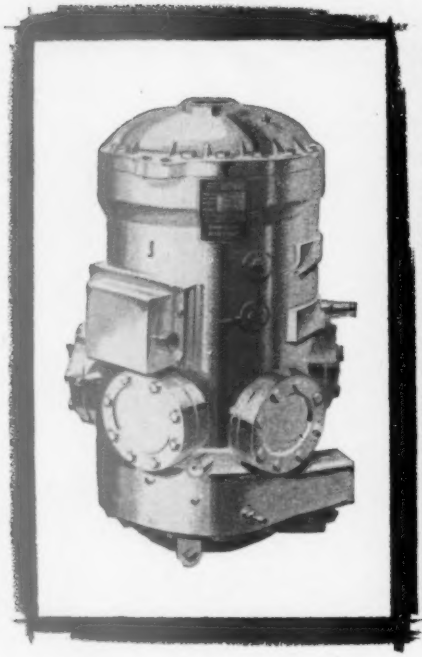
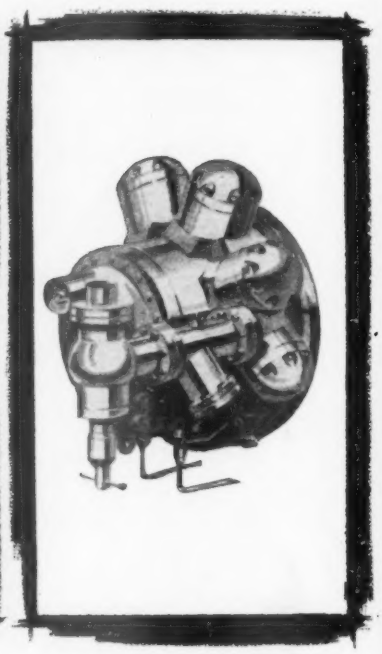
Here's your chance to assess the tremendous advantages that Chrysler offer throughout their extensive range of Refrigeration and Air Conditioning Equipment—your chance to see why Chrysler have maintained their leadership in this field for 25 years. You *need* to examine Chrysler Airtemp Equipment to see how advanced it is.



THE HEART OF AIRTEMP. *Airtemp Serviceable sealed Radial Type Freon Compressors 5 hp, 7½ hp, 10 hp and 15 hp. Entirely sealed inside cast iron crankcase to ensure long trouble-free operation.*

THE HEART OF AIRTEMP. *Airtemp Hermetically sealed Freon Compressors 3 hp & 5 hp. Precision aluminium die cast crankcase. Floating type valves and aluminium pistons.*



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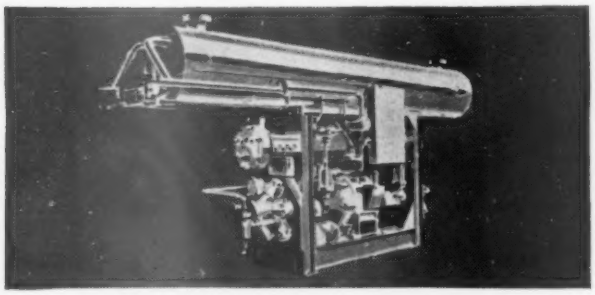
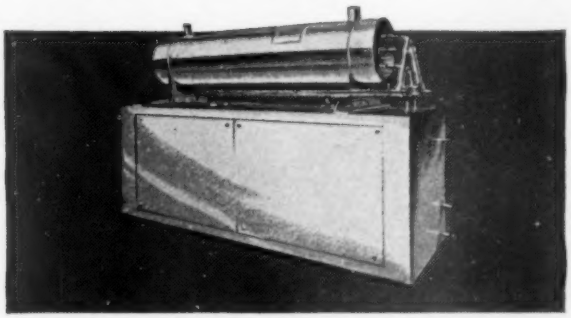
STAND 35

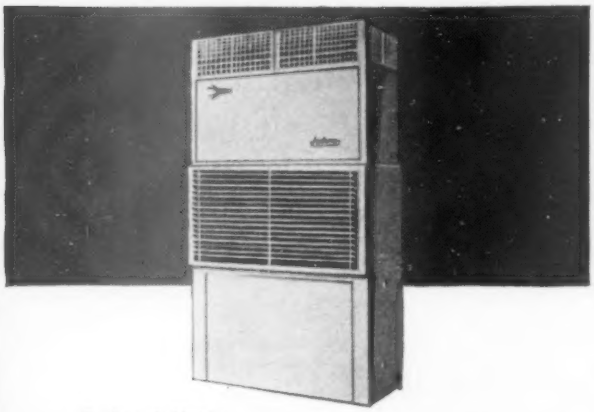
INTERNATIONAL REFRIGERATION & AIR CONDITIONING EXHIBITION, EARLS COURT, April 11th - 14th



Packaged Liquid Chillers in multiple range through 35 hp to 100 hp - Freestanding - resiliantly mounted units.



Packaged Liquid Chillers through range 7½ hp to 45 hp incorporating the famous Airtemp serviceable sealed compressors.



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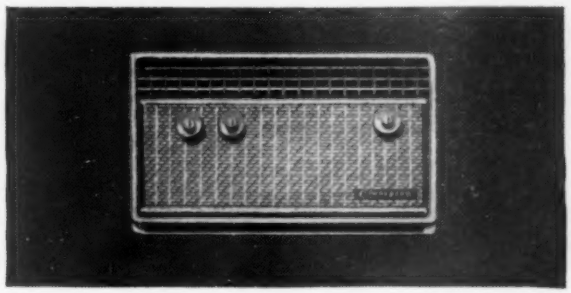
Freestanding packaged Air Conditioning Units 3-5 hp compressors. 7½-30 hp serviceable sealed compressors.

* *Room Units*
Comprehensive selection of Room Air Conditioners 1 hp - 2½ hp.



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Company _____

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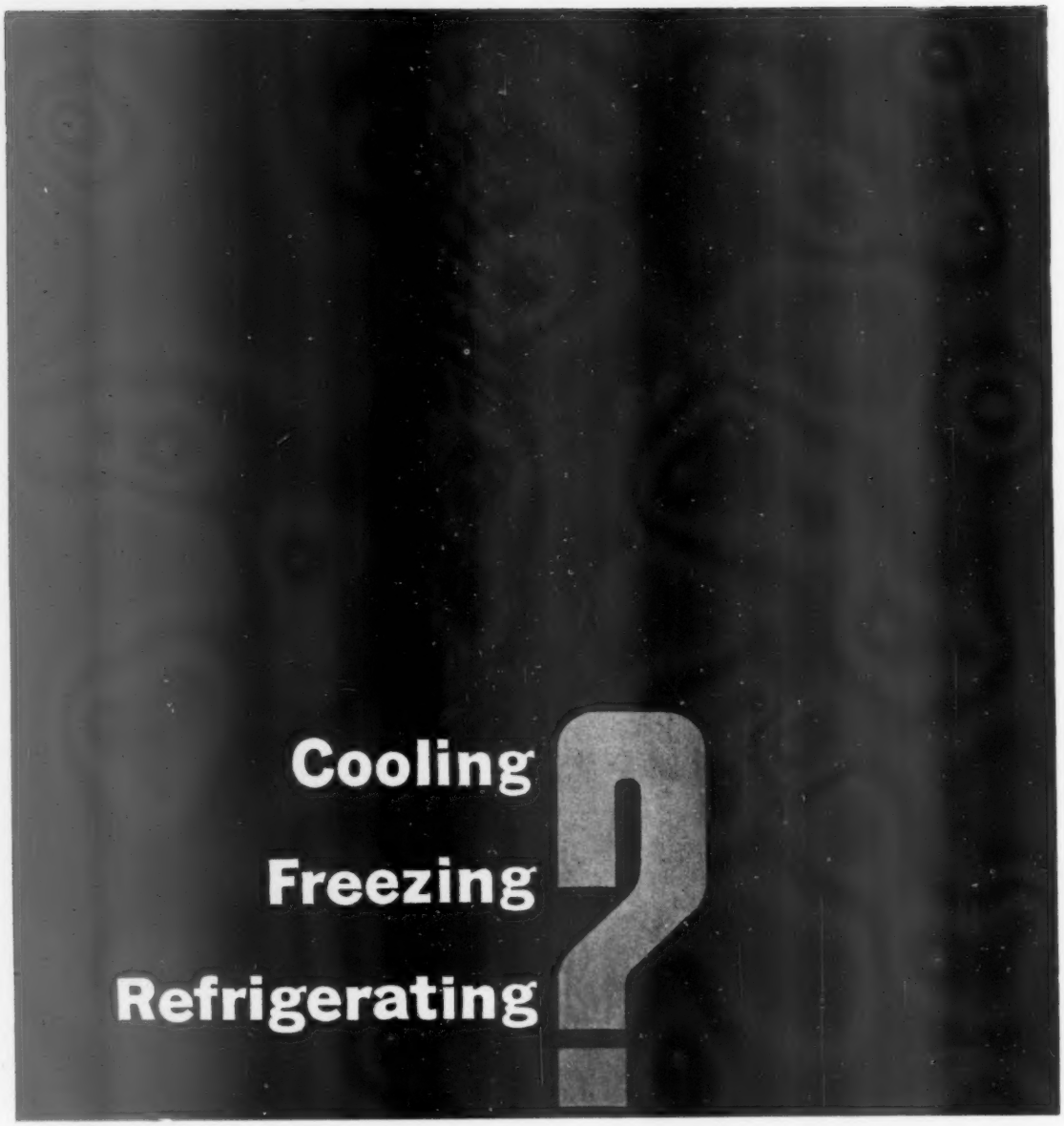

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Our comprehensive range of gilled tubes is used in refrigeration plant all over the world. We also supply condensers, evaporators and air coolers for use with all refrigerants. We are specialists in 'specials' too. Let us know your special requirements and we shall design and supply the equipment to meet them. Or we can build assemblies to your own design. It will save you time and money to exploit our extensive experience.
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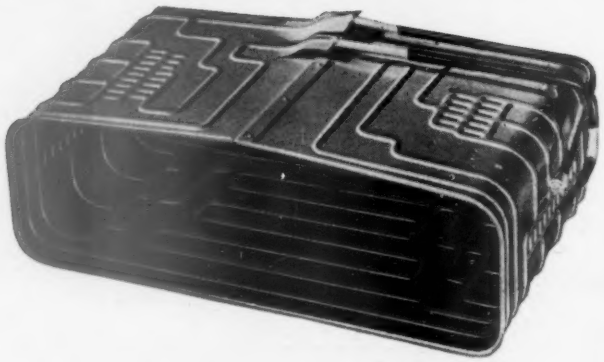

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Telephone: Leeds 63-7351

MAR. 292

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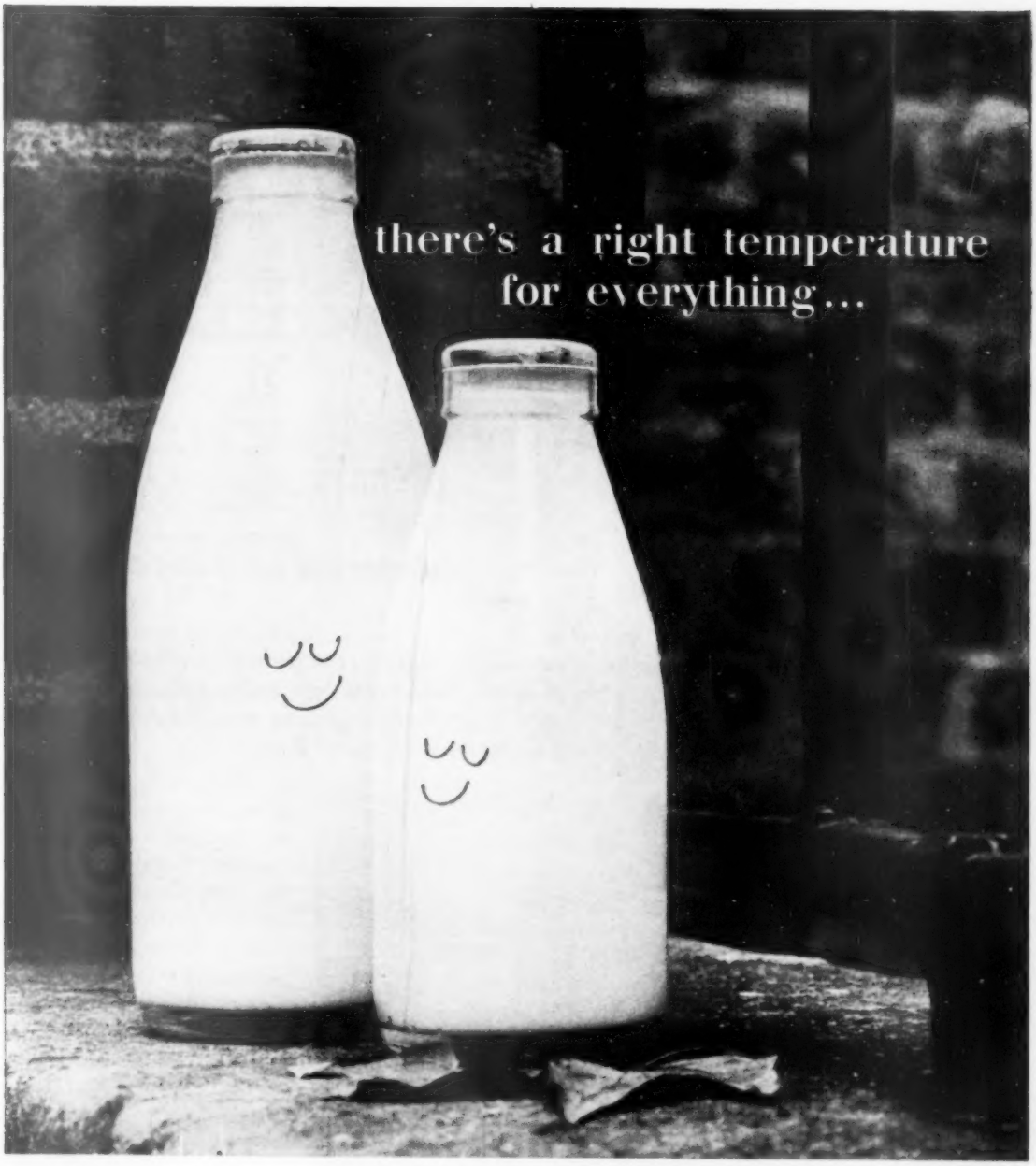

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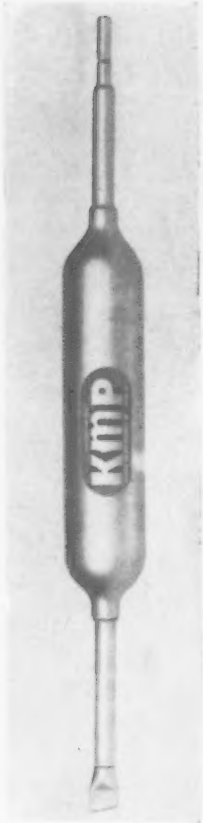

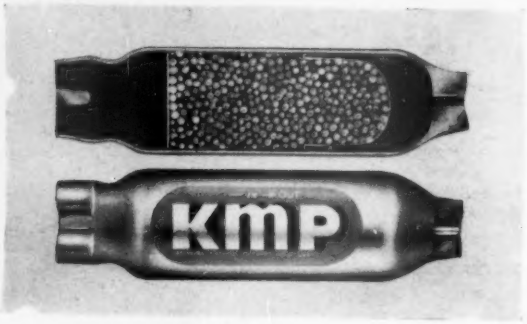

Kenmore can supply a wide range of driers with standard connections or made to your specific requirements. The double inlet drier is KMP's newest design, this additional connection enables you to pull a vacuum on the high side of the system, which reduces the process time and ensures complete system evacuation. The single inlet drier can be supplied if preferred.

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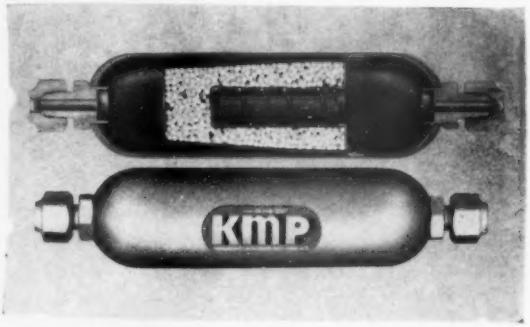

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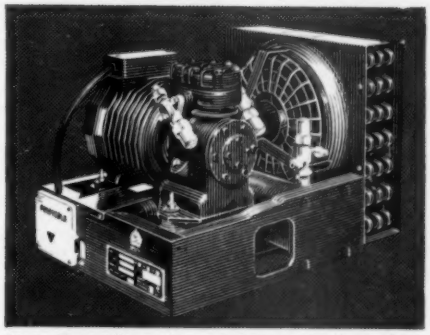

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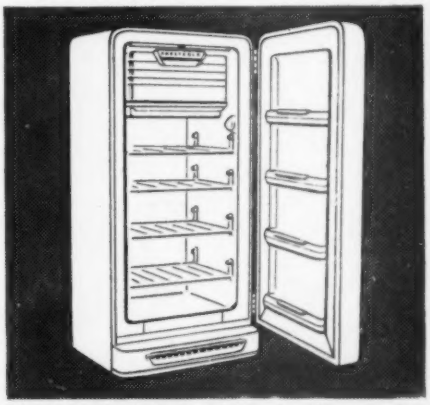
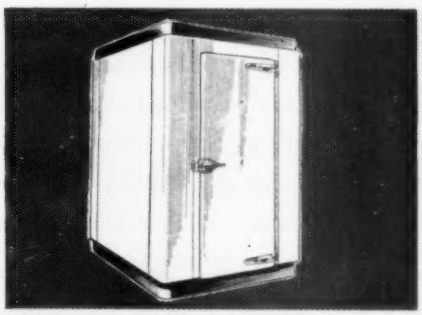


SC 141 Service Cabinet. A 14 cu. ft. refrigerator that takes up only 6½ sq. ft. of floor space. It has a chill tray for meat and fish, a 35 lb. frozen food locker, and two 30-cube ice trays. As a milk store it will hold 178½ pints of bottled milk. Overall size: 65¾ in. high; 30 in. wide; 30¾ in. deep.



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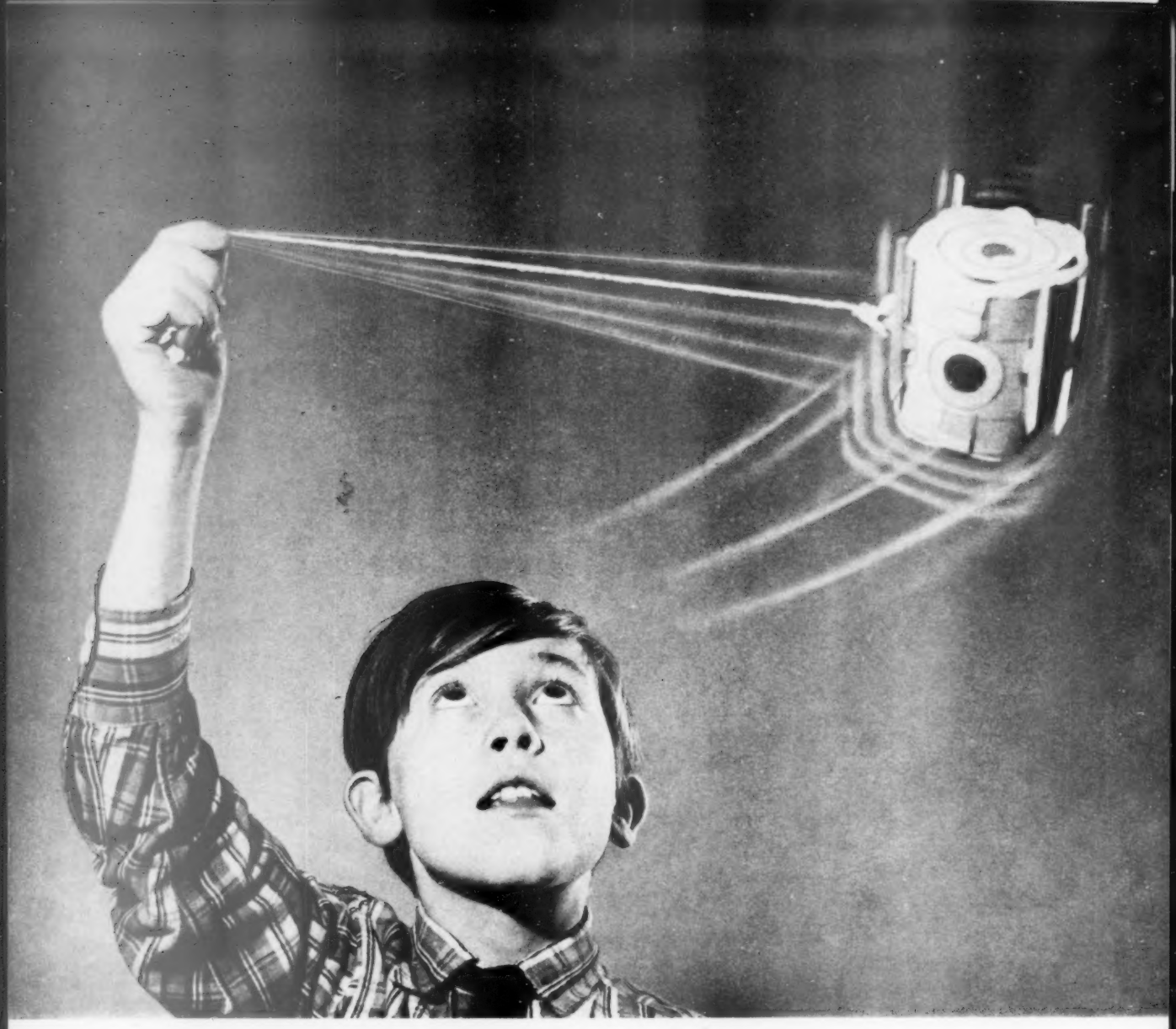

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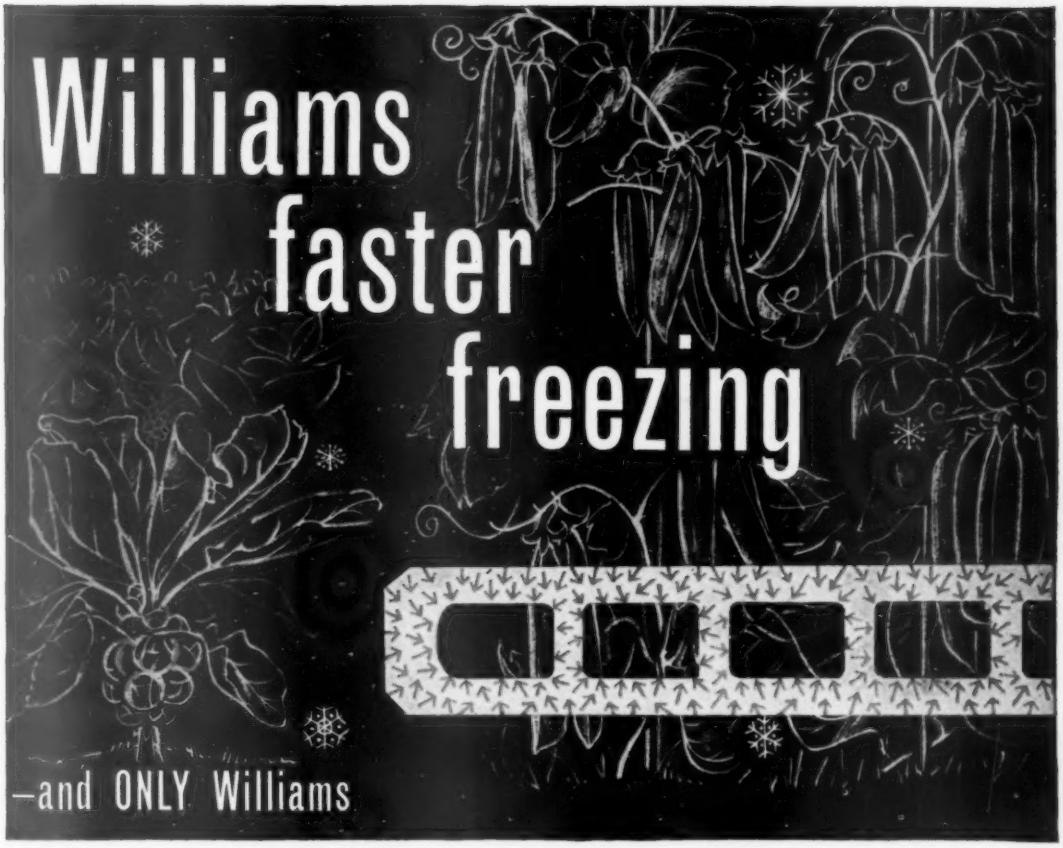

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How it's done. The new Williams 'Direct Conduction' alloy plate works on the double contact principle, but, there is an important difference. Unlike conventional plates which are fabricated and whose efficiency is limited by the wide pitching of the refrigerant tubes and the non-conductive vacuum between them—the Williams plate is a one-piece alloy extrusion. It is totally filled with integral refrigerant passages, close together, with direct through-metal conduction on all sides.

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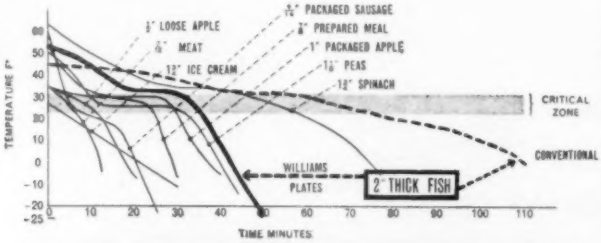

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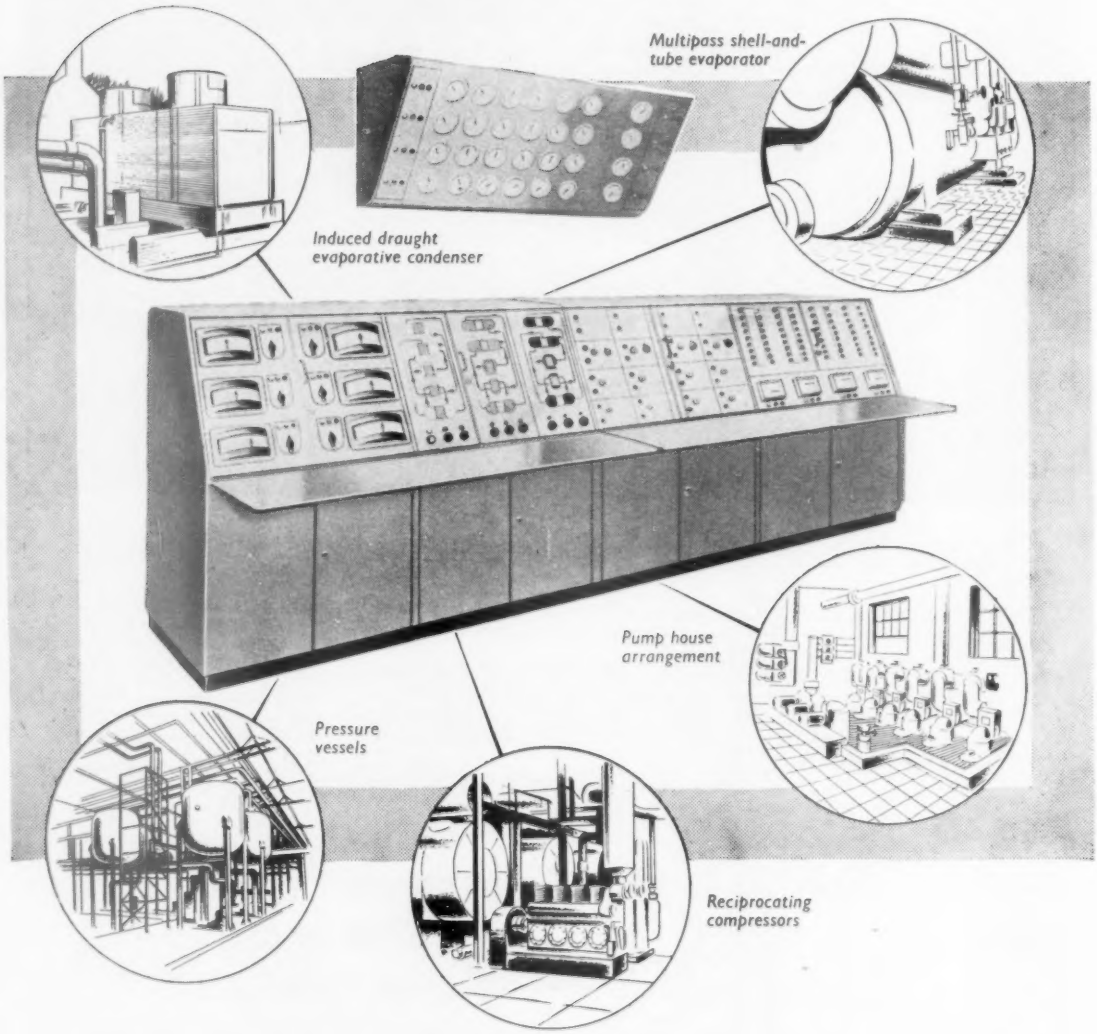

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ISCEON 11 (CCl_3F)	23.8°	74.8°
ISCEON 21 ($CHCl_2F$)	8.9°	48.0°
ISCEON 114 ($CClF_2\ CClF_2$)	3.6°	38.4°
	0°C	
ISCEON 12 (CCl_2F_2)	—29.8°	—21.6°
ISCEON 22 ($CHClF_2$)	—40.8°	—41.4°
ISCEON 13 ($CClF_3$)	—81.5°	—114.7°
ISCEON 14 (CF_4)	—128°	—198.4°

Isceon chlorofluorocarbons are RELIABLE, having high levels of chemical and thermal stability, and are produced to very high purity specifications. Isceon refrigerants are SAFE—being non-inflammable and non-combustible. Their vapours are non-irritant and non-toxic in relatively high concentrations. Isceon refrigerants are available with boiling points of –128°C. upwards.

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132

A VACANCY exists for a young graduate engineer in Ireland for a large public cold store. Preference will be given to an applicant with at least years practical experience in refrigeration industry. Please reply giving all relevant details and state salary required in confidence to Box 191. 191

ASSISTANT MANAGER required for large London Cold Store. Only applicants with a wide practical experience of cold store operations will be considered. The appointment is pensionable with good salary and conditions. Please write in full confidence giving age, details, and experience to Box "A.Y" c/o J. W. Vickers & Co. Ltd., 7, Great Winchester Street, E.C.2. 195

CLERK required for Offices of refrigeration company, in Central London area. Hours 8.30 a.m. to 5.30 p.m. Monday to Friday only. Experience not essential. Telephone Museum 5617 for appointment. 194

EXPERIENCED married up-to-date Frigidaire Zone Service Engineer required. House provided, well paid job in pleasant part of Cornwall. Write in first instance in confidence giving full details of skills and both present and past employment to Managing Director, Abbott Brothers, Cattedown Corner, Plymouth. 163

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REFRIGERATION ENGINEER required for London cold store. Ammonia experience essential. Apply stating age and experience to C.W.S. Meat Department, 91/3, Charterhouse Street, E.C.1. 208

YORK SHIPLEY LIMITED require personnel for their commercial department. Considerable expansion and reorganisation makes opportunities available for sales engineers or application engineers with experience of Refrigerant-12 and Refrigerant-22 plants up to 15 h.p. The location would be at head office in London. Send all details in first instance including educational standard, refrigeration experience and any auxiliary qualifications such as languages, etc., to Commercial Manager, York Shipley Limited, North Circular Road, London, N.W.2. 190

APPLICATIONS/SALES Engineers and Draughtsmen; Industrial Refrigeration. Location Norfolk; Top salaries, etc., for experienced men. Housing available. G. Williams Engineering Co. Ltd., Disraeli Road, London, N.W.10. 211

TECHNICAL SALES EXECUTIVE

Position of TECHNICAL SALES EXECUTIVE in LONDON Office offered by George Barker & Company (Leeds) Ltd., to zestful, ambitious young man, 25-40, with "personality." Knowledge of refrigeration and/or refrigerated display cases, self-service application a distinct advantage. Training given.

This is a top Executive position with a high commencing salary and the usual benefits—car, expenses, etc., and with really outstanding prospects for the future.

Fullest details (in strictest confidence) to The Managing Director, George Barker & Company (Leeds) Ltd., Elder Road, Leeds, 13. 212

VACANCY for qualified and experienced service engineer for commercial refrigeration in the East Midlands A well appointed flat is available, suitable for married couple, without children. Write to Fred Hawkes (Refrigeration) Ltd., Polar Works, Park Road, Rushden, Northants. 176

SITUATIONS WANTED

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SALES MANAGER requires position with Distributor or Manufacturer; to Train and Supervise salesmen and build a comprehensive selling organisation. Prepared to move to any part of the country. Reputation 13 years selling commercial refrigeration, average turnover £25,000 per annum. Three years as Area Manager large Refrigeration Manufacturer. Sales Manager for U.K. for large Refrigeration Company. Reason for this change. Family responsibilities, 40 years of age, and travelling 1,000 miles a week warrant my presence with a growing family more often. A member of Institute of Sales Managers. Box 185. 185

EXECUTIVE (middle aged) with 24 years' experience in Refrigeration and Air-conditioning Contracting and Manufacturing, desires a change. Internationlly known, fluent in several languages, particularly interested in export. Prepared to consider any progressive proposition anywhere in Western Europe. Some capital at disposal, if necessary. Available September/October. Reply promptly, in confidence to Box 206. 206

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J. & E. HALL 4 x 3½ triple cylinder Freon Compressor, 10 h.p. Slip ring motor with auto starter panel 440 volts 3 phase. Remote air cooled condenser. Overhauled and in perfect condition. Not ex-W.D. Offers to St. Albans Refrigerator Co. Ltd., 149 Hatfield Road, St Albans. Telephone St. Albans 51186. 168

UNUSED 200 ton cold room equipment comprising coils, fans, 2-38 hp. Condensing units powered by two Lister diesel engines. Two sets double doors and six single doors—£2,200 per set ex-works Unused 100 ton cold room equipment comprising: coils, fans, 2-26 h.p. condensing units powered by two Lister diesel engines. Two sets double doors and four single doors—£1,500 per set ex-works. Unused 5 h.p. self-contained refrigerating units—£90 each ex-works. Apply: Polarcold Ltd., Congleton, Cheshire. 169

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THREE 6 in. × 6 in. Ammonia Compressors, by J. & E. Hall, complete with motors, control gear and other ancillary equipment. For further particulars write Box 202. 202

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SALES REPRESENTATIVE required for expanding Private Company. Must be experienced Commercial Salesman able to work on own initiative in Hampshire area. Remuneration by salary, commission and car allowance. Apply in confidence to Andover Electrics, 5 Swan Court, Andover, Hants. 187

WANTED

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The advertiser controls for Great Britain the outlets of the largest, old established Vending Machine Manufacturers in the World. The complete range of machines cover all types of vending from merchandising to Hot and Cold Drink Machines, complete Automatic Canteen and Food Vendors. The advertiser is looking for live dealers with progressive sales staff, showrooms and established sales and service organisation. The opportunities are tremendous for such live dea'ers, and we are of the opinion that our merchandise would work hand in hand with live Refrigeration dealers.

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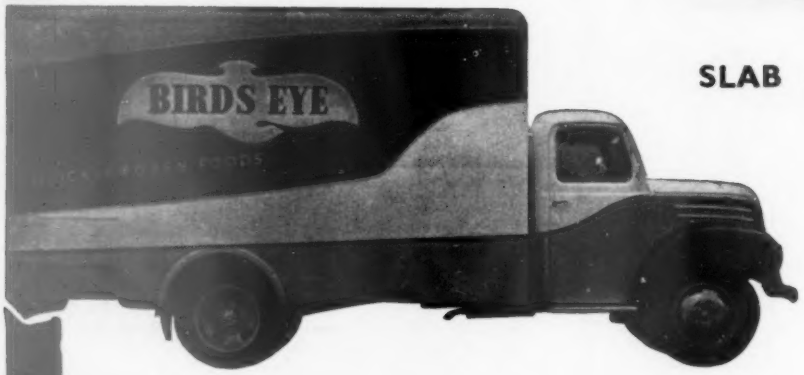

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and Air Control

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COLD STORAGE AND PRODUCE REVIEW
and ICE AND COLD STORAGE

Established 1898

VOLUME 64 NUMBER 756

MARCH · 1961

Contents

Editorial	246
News of the Month	248
Picture of the Month	249
Freeze-Drying Developments	250
Low Temperatures in Auto Field	252
"Top Twelve" Show	254
Specialist Firm with New Ideas	256
R.S.A. News	261
Serviceman's Quiz	262
Physical Society's Exhibition	263
Commercial and Industrial Section	264
Shop Refrigeration	269
Institute of Refrigeration Bulletin	273
New North London Cold Store	277
Air-Conditioning Multi-Storey Buildings (contd.)	278
Ice Rink Construction	284
A Fruit Glut?	287

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The world-wide circulation of this, the original and oldest journal of the British Refrigeration Industry, carries "MODERN REFRIGERATION" by postal subscription into the following countries:—

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EDITORIAL . . .

Refrigerator Makers "come back smiling"

June "M.R." Plastics Special

Thermoelectrics

● Those who were present at the British domestic refrigeration industry's "top twelve" show at the Café Royal last month would not have guessed, had he or she not known the facts, that these makers took pretty severe punishment in the last selling season. So strenuously did these manufacturers grapple with their problems in 1960 that they have been able to present new models, in some cases completely new ranges, for the Ideal Home Exhibition now proceeding. And make no mistake about it, these British refrigerators are world-beaters.

● The progress of this sector of the industry has been phenomenal. This is best illustrated by the words of the chairman of DoRDeC, Mr. E. G. Rowledge, when he opened the "top twelve" show: "When we started DoRDeC nearly five years ago, the domestic refrigerator was generally looked on as a luxury. It had to struggle under a penal rate of purchase tax, 60 per cent., and not surprisingly only 8 per cent. of homes in this country had a refrigerator. I am glad to say that all that has changed. Not without some encouragement from us, the Government has brought purchase tax down from 60 per cent., first to 30 per cent., and now to 25 per cent. We have the backing of our M.P. friends and the enthusiasm of the Press to thank largely for that. To-day, 22 per cent. of our homes are equipped with a refrigerator. That really is progress but we still have a long way to go. We here in Great Britain are still way behind most of the other fully developed countries of the world in our use of domestic refrigeration. In the United States 97 out of every 100 homes have a refrigerator; in Australia 90 per cent. and in Canada 89 per cent. In Sweden 61 per cent. of homes have a refrigerator and in West Germany the figure has shot up from under 10 per cent. to 40 per cent.

● "We are glad that there has been some sign of light by the recent extension of the repayment period from two years to three years. What really worries our public and the public generally who want to buy domestic appliances is not the repayment period but the size of the initial deposit. Until that deposit is brought down from 20 per cent. to 10 per cent. the public will still be held back from buying domestic refrigerators and other domestic appliances in the quantities that they and we want. And surely in this day and age of husbands and wives going out to work and of all-round progress in domestic appliances, the public deserve to be helped and not hindered in buying the things that make life easier and pleasanter." added Mr. Rowledge.

● Commenting upon the H.P. changes, Mr. W. Roxburgh, Morphy-Richards' managing director, said recently "The extension from two to three years to pay without a reduction in down payment to say 10 per cent. will do little to help the major domestic electrical appliances industry. H.P. restrictions of 20 per cent. down and two years to pay introduced in the last budget have never really affected Morphy-Richards' small appliances business. The new terms will therefore have negligible effect there." On major appliances such as refrigerators the H.P. restrictions and the timing of their imposition last April had a salutary effect. In 1958 H.P. restrictions were unexpectedly removed altogether, contrary to the wishes of the domestic refrigerator industry. A demand was thus immediately created quite beyond the industry's capacity to supply. Established companies at once increased their production facilities. New companies were tempted into the field and foreign refrigerators were temporarily imported in large numbers. Just as supply was overtaking demand, H.P. restrictions were reintroduced. In particular, the deposit of 20 per cent. sharply aggravated the natural slowdown in demand. As a result, manufacturers have had the greatest difficulty in maintaining their production at the higher rate and keeping their increased personnel force fully employed.

● The June issue of MODERN REFRIGERATION will be a Special Plastics Number. Already over 350 firms from 13 countries have arranged to display their products at this year's International Plastics Exhibition—INTERPLAS 61—in London from June 21 to July 1. Countries represented include Austria, Belgium, Canada, Denmark, Finland, France, Great Britain, Germany, Holland, Italy, Sweden, Switzerland and the U.S.A. Visitors to the exhibition will see assembled in the three halls of Olympia, covering an area of 360,000 sq. ft., machinery, materials and products together representing the complete picture of world plastics progress. Vast displays of fabricating and ancillary equipment demonstrated by the major machine builders will highlight the latest advances in plastics moulding, vacuum forming, extrusion and blow moulding. The complex array of modern plastics materials will include an extensive range of typical end uses, both current and potential, and many new materials now under development will be shown. Many thousands of finished products will also be on view at INTERPLAS 61, illustrating the most up-to-date contributions of plastics to consumer goods and industrial components. The Exhibition, organized by the Iliffe journals *British Plastics* and *International Plastics Engineering* with the co-operation of the British Plastics Federation, has been held every other year since 1951. Attendance at the last show was in excess of 106,000. No other industry has attracted keener interest than the refrigeration trade as an outlet for modern plastics.

● Miniature refrigerators which work on the principle of thermoelectric cooling discovered nearly 130 years ago are now being marketed by Salford Electrical Instruments. It will be recalled that the discovery of semi-conductors awakened fresh interest in the principle because these new materials give ther-

moelectric cooling effects one hundred times greater than metals. Six years ago the G.E.C., parents of Salford Electrical, demonstrated a thermoelectric refrigerator at the Royal Society. One of the new units marketed by Salford Electrical contains four junctions and has a cooling capacity of 1 watt. It is a small cube and typical of its many applications is the cooling of electrical components which must operate in high ambient temperatures, when it serves to increase the power rating of transistors. For instance, thermoelectric cooling is being used to cool the lead sulphide detector cells in the infra-red sensing devices of air-to-air missiles.

● Greater flexibility of plate freezers has lately been achieved by a new choice of components. This interesting and successful development in plate fish freezer design is achieved by using a thermostatic expansion valve instead of the conventional valve and distributor. Mr. Ted Hill of Messrs. Hewson & Turrell, Grimsby, who designed and built the new freezer states: " The conventional fish freezer using one valve and a distributor has the limitation that it must be evenly loaded with similar fish or packs in each station and that all stations must be filled to avoid uneven freezing. It became obvious to me that individual control of the plates would provide greater stability. I decided to install eight thermostatic expansion valves in a new 16-plate freezer, one to each two plates in series." The type chosen was particularly suitable because control is achieved by returning the suction line through the valve head, giving sensitive reaction to evaporator. The result has been outstanding. Not only does the freezer process all the fish equally but it is completely indifferent to variation in load and, in fact, stations can be left empty without adversely affecting the other stations. Process time has been reduced, and service is much simpler. What makes it more remarkable is that the cost of the new system is slightly less than the old. We understand that the valve used is Teddington's RD t.e.v.

THERMOELECTRIC HEATER-FREEZER

GORDON G. MESSICK, aerospace research and development engineer of Hughes Aircraft Company's laboratories in the United States, has recently developed a tiny new device that can produce either heat or cold on demand. The new device is so efficient that it can freeze or boil a drop of water on power from two flashlight batteries. It is smaller than a paper clip; heats or cools at the flip of a switch. In clusters, its uses vary from maintaining room temperature in a space-ship to operating an instant-defrosting refrigerator with no moving parts.

Messick has just demonstrated a model and presented a technical paper on the development with co-author Robert M. Jepson, at the American Institute of Radio Engineers winter meeting in Los Angeles, California.

The device works on the principle of thermoelectric cooling which has been known for more than 100 years but which was impractical because of the large amounts of current—from 20 to 30 amperes—that were required. Hughes Aircraft Company has developed a new technique of fabricating the thermoelectric material that makes it possible to operate at one-tenth of the current previously needed.

Because of its low current requirements, the device is ideal for use in a space vehicle, either for making passengers comfortable or for cooling electronic systems. *Its heating efficiency is up to eight times as high as conventional resistance heaters* such as on electric toasters or stove elements.

100 Degrees below Zero

The company has built a three-stage " cascaded " cooler that *brings temperature down to* 100 *degrees below zero Fahrenheit* and is being used to cool an experimental infra-red detector. The device requires only two amperes of current.

A heat-control oven is also being built which will hold an even 70-degree temperature in weather varying from 40 below zero to 180 above while using less power than a car headlight. Even greater temperature extremes and higher efficiency are expected as newer materials are discovered.

NEWS OF THE MONTH

Refrigeration and A-c Exports.—During January, 1961, air-conditioning and refrigerating machinery and fans (commercial and industrial sizes) to the value of £1,337,965 weighing 2,104 tons was exported from the United Kingdom. Comparable figures for January, 1960, were 1,449 tons, worth £942,954.

* * *

Exports' Analysis.—Of the 2,104 tons of air-conditioning and refrigerating plant worth £1,337,965 exported by Great Britain in January—quoted in the preceding paragraph—75 tons went to the Union of South Africa, 37 tons to India, 43 tons to Australia, 57 tons to New Zealand, 36 tons to Canada, 269 to "other Commonwealth countries," 56 tons to Eire, 27 tons to Sweden, 542 tons to Western Germany, 44 tons to the Netherlands, 34 tons to Belgium, 50 tons to France, 4 tons to Italy and 830 tons to "other foreign countries."

* * *

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigeration machinery during January, commercial refrigerating machinery accounted for 445 tons worth £225,134, industrial plant and equipment for 700 tons worth £342,459, and refrigerating machinery, equipment and parts for 549 tons worth £450,455.

* * *

Exports of Small Refrigerators.—During January, 1,083 tons of complete refrigerators and domestic refrigeration equipment were sent overseas from Great Britain. These exports were worth £669,257. The 1,083 tons comprised 48 tons to the Union of South Africa, 10 tons to Rhodesia and Nyasaland, 40 tons to New Zealand, 47 tons to Canada, 460 to "other Commonwealth countries and Eire," 47 tons to Sweden, 82 tons to Western Germany, 5 tons to Italy and 344 tons to "other foreign countries."

* * *

New Factory for Birds Eye.—Birds Eye Foods Limited have acquired additional premises at Hull. On March 1 they took possession of a factory in Gloucester Street, previously owned by Mac Fisheries Limited. They already had a small factory in Hull, but increasing demand for quick-frozen fish and fish fingers made expansion there imperative. Both Hull factories are ancillary to the company's main Humber factory in Grimsby and are, therefore, under the control of the Grimsby factory general manager, Mr. E. W. Watson. It is expected that Birds Eye's expansion at Hull will mean increasing employment opportunities.

* * *

Export Drive.—Mr. S. B. Hainsworth, chairman of J. H. Fenner & Co. (Overseas) Limited, recently announced staff appointments to further the firms export drive. Mr. John Cleator, director and general manager is now assisted by divisional directors in Mr. John Perry for India, Mr. Alec Bingley for Africa, Mr. John Davies for the "Seven" and Mr. Gerald Munby for the "Six." Four of these executives are at present abroad giving branches and agents the benefit of the latest developments in Power Transmission.

* * *

Industrial Exhibitions Director Joins HEVAC Conference Committee.—T. E. Rees, managing director of Industrial Exhibitions Limited has accepted an invitation to join the committee of the International Conference on Heating, Ventilating and Air Conditioning, which is to be held during the period of the first HEVAC Exhibition at Olympia, London. Industrial Exhibitions Limited are the organizers of the first International Heating, Ventilating and Air Conditioning Exhibition (Olympia, London, September 26 to October 6, 1961). Before the closing date for applications for space the exhibition is already full and has a waiting list of firms wishing to exhibit.

* * *

A New Fenner Company in Africa.—In 1960, Mr. S. B. Hainsworth, Chairman of J. H. Fenner & Co. (Overseas) Ltd., announced the formation of J. H. Fenner & Co. Africa (Pty) Ltd. to provide for an expansion of the Company's interests in that market. Since then negotiations have been completed for the acquisition by Fenner (Africa) of a controlling interest in an Engineering Company in the Johannesburg Area. The forward programme now provides for the development of the new organization, to be known as Fenner K.S.G. Manufacturing Co. (Pty) Ltd., by adding to its existing range of production. This follows the pattern already in force in India and Australia; associating in this new venture are Reunert & Lenz Ltd., exclusive Agents for the marketing of Fenner products in the Union of South Africa since 1928.

* * *

New Store Holds 200,000 Chickens.—As part of their major plans for expansion in all fields of production, marketing and sales, the Buxted Chicken Company Ltd. have installed a new large cold store in their recently opened depot at Urmston, Manchester. "The store easily holds 180,000 birds, and it has a maximum capacity of 200,000" states the Buxted northern regional sales manager, Mr. Clive Clague. Cubic capacity is 50,000 c.ft. and it is refrigerated to -5° by coil refrigeration. The Urmston depot, which now supplies over 2,000 retail outlets in the Lancashire sales area, opened at the end of last year. The depot was designed by Mr. M. Ferguson, A.R.I.B.A., of Lanchester & Lodge and it took five months to build at a cost of £85,000.

* * *

Venezuelan Trade Mission.—12 of Venezuela's leading business men and industrialists arrived in Britain last month on a fact-finding tour of British industry. Announcing this, Lord Rootes, chairman of The Western Hemisphere Exports Council, said that the mission was one of the most significant ever to come to this country from Latin America. The visit is being jointly sponsored by the Board of Trade and The Western Hemisphere Exports Council, and the members of the party represent all sections of Venezuelan industry and commerce, including power and development corporations and the building and textile industries. Prominent bankers and insurance executives are also in the party.

* * *

Northern Ireland's Record Year.—Sixteen manufacturing firms from Great Britain, the United States and

the Continent decided last year to establish themselves in Northern Ireland, and a further 13 among manufacturers already there embarked on schemes of expansion. This was announced in the Queen's Speech at the opening of Parliament in Belfast last month. They include I.C.I., B.P. Ltd., Batchelors Foods Ltd., Grundig Works, Ltd., Bridgeport Brass Co. (Connecticut), Clutsom and Kemp Ltd., Associated Food Manufacturers, Ltd., Gascoignes (Reading) Ltd., J. Bibby and Sons Ltd. Among firms embarking on expansions were Jeremiah Ambler (Ulster) Ltd., Cyril Lord Carpets Ltd., G. B. Britton Ltd., English Sewing Cotton Co. Ltd., Ira Ickringill and Co. Ltd., Hughes Tool Co. Ltd. (Texas), Behr-Manning Ltd. (New York.)

* * *

New Zealand Development Scheme.—Dalhoff and King Ltd. have announced a scheme to establish a revolutionary food processing plant, using the freeze-dry process, and plans to develop 19,000 acres of the Awarua Plains in Southland, New Zealand. The land development starts this year and will be the biggest private enterprise project yet in New Zealand.

* * *

Trade Missions to Europe.—Details of the first series of fact-finding missions organized by the Export Council for Europe to survey export prospects for British firms was announced last month. We learn that in all, 25 members of the Council took part in the missions, which started on February 5 and were completed by the end of the month. The team members conferred on the spot with commercial representatives of the British Government, British trading interests, existing importers of British goods and other bodies. They studied the extent of competition from other countries, questions of price, quality and design and market needs generally. Ten further missions of similar size will be carried out during May and June covering other European countries. It is emphasized that the object of those teams is fact finding and not fault finding.

* * *

Albion Trucks For States.—Irvin and Johnson, of Salisbury, Southern Rhodesia, have just ordered two Albion Chieftain trucks from Leyland Albion (Central) Africa Ltd. for distribution of frozen fish products throughout the States. The vehicles will have Barlows refrigeration equipment and body work by Zambesi Coachworks.

* * *

Refrigerated Truck For Cheese Transportation.—The first trial consignment of Kenya cheese to be exported to Rhodesia by refrigerated truck, left Nairobi on January 13. It is the first time a refrigerated truck has been used to transport cheese from East Africa, and is an experiment to cut costs for small consignments of cheese which would otherwise be airfreighted individually.

* * *

F.B.I. Delegation to Spain.—Sir William McFadzean, president of the Federation of British Industries, led an F.B.I. delegation to Spain on February 12, 1961. The visit was in response to an invitation from the Consejo Economico Sindical Nacional, which sent a party of high level industrialists to the United Kingdom in April last year. The delegation's headquarters was in Madrid and from there its members visited various industries in the provinces. The delegation discussed the opportunities for increasing Anglo-Spanish trade.

* * *

J. & E. Hall, Change London Offices—J. & E. Hall Ltd., announce that as from February 3, 1961, the company's central London offices at 10 St. Swithins Lane, London, E.C.4, have been closed. From this date the telephone number MANsion House 9811 has been discontinued.

With effect from February 4, 1961, the company now operates from the following London addresses :—

60 Rochester Row, London, S.W.1 (refrigeration, lift and escalator sales). Tel. : VICtoria 0354.

1-2 Silex Street, London, S.E.1 (refrigeration, lift and escalator service). Tel.: WATerloo 1901 (night service) Dartford 23456.

Royal Albert Dock, London, E.16 (maritime service). Tel. : ALBert Dock 2620 and 4182.

Regina House, 1-5 Queen Street, London, E.C.4 (shipping and insurance). Tel. : CITy 9561.

The former 1-2 Silex Street, London, S.E.1, telephone number WATerloo 4767 was discontinued from February 3, 1961. The head office and main works of the company remain at Dartford, Kent (Tel. Dartford 23456).

* * *

The Minister of State, Board of Trade, **Rt. Hon. Frederick Erroll,** M.A., M.I.E.E., A.M.I.MECH.E., M.P., will open the Tenth Electrical Engineers Exhibition on Tuesday, March 21, at 12 noon. Before his appointment as Minister of State, Mr. Erroll, himself a qualified electrical engineer, was a director of several engineering and mining companies.

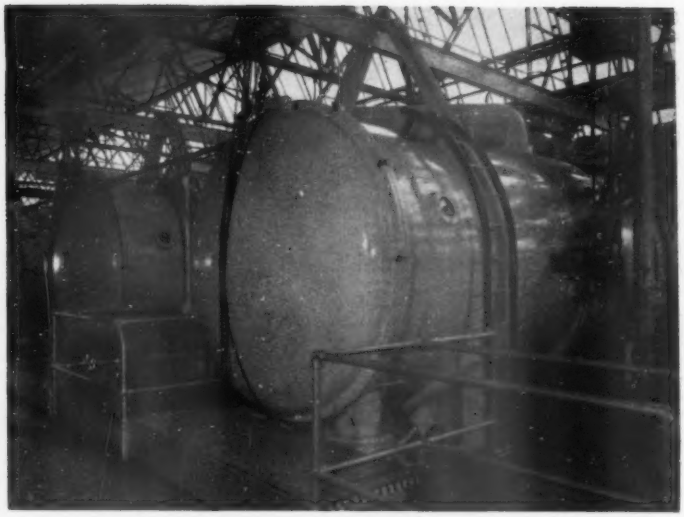
Picture of the Month

THE CALL FOR EXPORTS

Electrolux refrigerators being loaded at Leagrave Station nr. Luton, at the beginning of their journey via Poland and Russia to Teheran.

Freeze-Drying of Food Products on a Commercial Scale

Developments by Mitchell Engineering Limited



The original three cabinets of Mitchell Engineering's freeze-drying plant installed in a Hertfordshire factory.

EXTENSIONS to Britain's first large-scale industrial freeze-drying plant have just been completed by Mitchell Engineering Limited, who designed and installed the original plant at a Hertfordshire factory in 1958. The whole plant has recently been freeze-drying coffee extract in a commercial scale, but within the last few weeks experiments have been conducted on the freeze-drying of milk. Results so far have been encouraging and further tests are planned.

In addition, Mitchell Engineering Limited, are building an experimental freeze-drying plant in which food manufacturers will be invited to freeze-dry their own particular products and ascertain for themselves the advantages of this process.

The process of freeze-drying has been used for a number of years, particularly for the treatment and preservation of blood plasma, vaccines and biological materials. Roughly, the process consists of freezing the substance and removing its water vapour by sublimation under vacuum while the substance remains as a frozen solid. The water vapour is removed from the system by means of a refrigerated vapour condenser or a steam ejector.

The Hertfordshire plant consists of four cylindrically shaped cabinets, as can be seen in the photographs. In this plant, refrigerated vapour condensers are utilized and the evacuation of the cabinets to a pressure of 0.1 mm. of mercury is achieved by means of suitable high vacuum pumps.

The coffee is frozen *in situ* and the heat of sublimation is supplied by electrical plates situated above

The tray assembly in Mitchell Engineering's pilot freeze-drying plant.

each tray and by circulating warm trichlorethylene under the tray. In addition, the process can be semi-continuous; the liquid coffee is loaded, and the dried powder removed, while the cabinet is shut, thus reducing the time cycle.

Another special feature of the design is the incorporation of a cycle/time control system. This ensures that the refrigeration temperatures, vacuum and the temperatures of the heater plates, are maintained at their predetermined optimum throughout the whole cycle.

Reconstitution of the dried product is effected by adding water. The product returns to its original appearance shape and texture almost instantaneously. This is particularly interesting when applied to foodstuffs, for, not only does the product return to its same size and appearance, but the taste is not noticeably affected. Additional advantages are, lightness in weight and almost indefinite keeping qualities at normal temperatures if the product is packed in a container which is impervious to oxygen and moisture. No refrigerated storage is necessary.

With the experience gained from the Hertfordshire plant and from the work carried out on the original pilot plant, Mitchell Engineering Limited are now prepared to offer high capacity freeze-drying plants of improved design and performance to process a large variety of foodstuffs, both solid and liquid. Special improved mechanical arrangements for containing the various products within the cabinets ensure a minimum time cycle and a maximum load within the available space. Below are listed some of the materials that can be successfully freeze dried on an industrial scale: Brussels sprouts, Cabbage, Carrots (quartered or sliced), Chicken slices, Chip Potatoes, Coffee, Fruit and Fruit Juices, Fish, Green Beans (whole or sliced), Meats, Milk, Peas, Soup mixes (meat and vegetable), Spinach, Tea.

SPRAYING INSULATION

AEROGRAPH DeVilbiss held a fascinating demonstration of a new development in thermal insulation at their premises in Lower Sydenham, last month. Their equipment, known as "Foam-in-Place," sprays rigid polyurethane foam made to a special formulation by the Baxenden Chemical Company Limited.

Formerly, there have been two methods of producing foam—"machine mixing," using special and necessarily expensive equipment for the production of foam sheets or blocks, and "batch mixing in buckets" (using hand or electric stirring). In both cases it is necessary to use some form of shuttering or battening to retain the foam in position.

For some jobs the older methods will continue to remain the most economic way of producing foam, but a large number of applications particularly lend themselves to this new spray system. For example, it may not be economical to install the equipment to spray one roof, but for a housing estate it most certainly would. The new method is quick (a roof could be sprayed in half an hour) and the material light. Cost is approximately 6s. per lb.

The new Aerograph-DeVilbiss "foam-in-place" spray equipment comprising pressure feed tanks, air transformer and the new patented gun.

Some of the applications were shown during the demonstration including a quick-fire spray insulating a large section of steel plate, a roof interior, a complex arrangement of service pipes, a ventilation duct and a storage tank. When sprayed on the surfaces, the liquid expanded rapidly into a 2-in. layer of rigid foam covering the surface.

The steel wall of a chemical storage container receives its all-the-year-round protective coating of urethane insulating foam—applied the easy way—by the new Aerograph - DeVilbiss "foam-in-place" spray equipment.

To show the anti-drumming qualities possessed by this foam, metal and plastic panels used in cars and planes were sprayed. The foam can be used to prevent the entry of moisture, and for shock absorption. To demonstrate this, the internal lining of a packing case was also sprayed.

The spray equipment comprises the following main items :

1. Type JCG-505 spray gun.
2. Type QMA pressure feed tanks, 10 gallon capacity arranged for maximum working pressure of 100 lb p.s.i. and complete with stainless steel fluid passages and fittings.
3. Type HLE air transformer.

The total price of equipment complete with hoses, connextions and sundry fittings is £416. Price of the equipment as above but with 5-gallon capacity tanks is £388 10s.

Motor Accessory Firm Adds Cold Room to Engine Test Laboratory

IN Great Britain during the winter months, vehicle operation on the whole does not involve any great problems as exceptionally low temperatures are seldom experienced. Winter operating conditions do not call for any special measures, apart from normal anti-freeze and radiator blanking precautions. Such easy remedial factors for a few months may tend to impart a rather conservative outlook on cold weather operation by car and commercial vehicle users.

With our leading manufacturers in the automobile industry such a *laissez-faire* attitude is just the opposite from reality. Car, commercial vehicle and component manufacturers export a very large percentage of their output, and "overseas" does not always mean blue seas, palm trees and hot sunshine.

It is not necessary either to travel very far afield in order to experience great extremes in temperature.

On the Continent in Middle Europe, where the Gulf Stream has no influence and there are high mountain ranges, winter temperatures customarily drop to well below freezing point. In Switzerland for instance, winter temperatures around 15° F. are quite common and may even drop to −4° F. for several days, and in inhabited areas at higher altitudes up to 8,000 ft. it may occasionally get as cold as −31° F.

There are also many other localities outside Europe, for instance in North and South America, in which low winter temperatures are prevalent. Diesel engines on commercial vehicles, marine craft and agricultural tractors are now in common use all over the world and it is therefore necessary to be able to reproduce at home or at the source of manufacture, the operating conditions at which the engines and their components may be called upon to operate.

Simms Motor Units, the world's largest manufacturers of fuel injection equipment, have to take into account operating conditions likely to be met overseas, as Simms fuel injection, lighting and starting units are currently exported to all parts of the globe. Therefore Simms attach great importance to easy starting and correct functioning of their equipment under Arctic conditions; thus, in order to have available first-hand experience, it was decided to install a cold room at their works in East Finchley, in which extremely low temperatures could be simulated without the delay and expense of sending vehicles and special teams abroad.

Simms' cold room—cold start tests on 4-cylinder and single-cylinder engines.

The Simms cold room which measures 13 ft. 5 in. by 10 ft. 9 in. is entered through a separate air-lock compartment (8 ft. by 5 ft. 9 in.) and forms part of their well-equipped engine test laboratory. It is possible to accommodate a medium-sized car and engines developing up to 300 b.h.p. can be tested for cold starting.

Refrigeration plant has been supplied by J. & E. Hall Ltd., and temperatures down to −40° F. can be achieved in the cold room. The cooling unit is at one side of the cold room and the compressors are housed in a chamber over the ceiling. Twin fans circulate the air in the cold room over cooling coils in which "Freon-22" gas refrigerant is employed. The operation of the fans is thermostatically controlled so as to maintain the prescribed temperature automatically between limits of plus or minus half a degree Fahrenheit. When the room is at normal ambient atmospheric temperature, the refrigeration plant

can reduce the temperature to -40° F. within three days. There is a choice of automatic operation at constant temperature or manual control, enabling temperature tests to be carried out for various temperature cycles.

Brick walls with an insulating lining of twelve inches of cork are employed in the construction and the interior is panelled with aluminium sheeting. Strip heating elements are inserted in the edges of the doors to prevent these from being frozen solid to the frames. A large multi-thickness plate-glass inspection window is provided so that operators inside the cold room can be kept under observation, when working under intense cold conditions. On the engine test side of the room an overhead beam with block tackle of 1 ton lifting capacity is provided for installing and removing engines.

As Simms Motor Units Ltd. will not have the cold room in constant use, when the installation is not allocated for their own testing programme, they are prepared to make the room available to any interested organizations on a hiring basis.

ALUMINIUM
in Ice-Making Plant

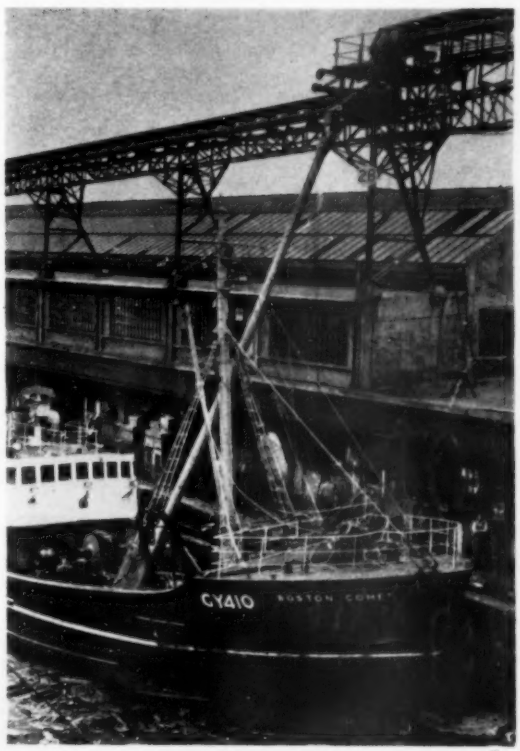
THE Grimsby Ice Company Limited, who produce a quarter-million tons of ice each year, and supply all Grimsby trawlers, make wide use of aluminium in the ice-making plant and in an ice-conveying system recently completed by W. J. Jenkins and Company Limited of Retford.

In the ice-making plant large blocks of ice are slid across a floor covered with Noral 65SWP aluminium alloy sheet which provides an admirable low-friction surface. Since the aluminium does not rust there is also no staining of the ice and maintenance costs are lower.

The new conveyer system is an extensive installation which receives the large blocks of ice from the plant, crushes them and then delivers the crushed ice direct into the holds of trawlers at the dockside.

There are 4 icing points each consisting of a telescopic chute which can be swivelled and is adjustable for length. The chute shown in the accompanying illustration is of 14SWG sheet in Noral 65SW aluminium alloy; it has a diameter of 1 ft., is 62 ft. long when fully extended and 34 ft. long when fully closed.

Noral aluminium alloy sheet protects the floor and provides a smooth, durable surface over which to slide blocks of ice at the plant of the Grimsby Ice Co. Ltd.



A telescopic chute delivers crushed ice into the hold of a trawler at the Grimsby Ice Company Limited. The conveyer system, which makes extensive use of Noral aluminium alloys, has been recently completed by W. J. Jenkins & Company Limited of Retford.

About four tons of Noral B51S and 65S aluminium alloy plate and sheet and one-and-three-quarter tons of 20SWG 3 in. corrugated sheet were used in the construction of the chutes, hoppers and external gantries. Aluminium was used in the conveyor system since it has been found to be more durable and less liable to denting than the galvanized steel formerly used. The lighter weight of the aluminium is also an advantage in the telescopic chutes, which must be easily manoeuvrable.

"Top Twelve" on Show

THE annual fixture of an "eve of the Ideal Home" show in the West End staged on behalf of the leading British domestic refrigerator makers by DoRDeC was marked on the 23 ultimo at the Café Royal, London. The "top twelve" consisted of :—

A.E.I.-Hotpoint Ltd.
Electrolux Ltd.
English Electric Co. Ltd.
Frigidaire Division of General Motors Ltd.
The General Electric Co. Ltd.
Kelvinator Ltd.
R. & A. Main Ltd.
Morphy-Richards (Astral) Ltd.
Prestcold Division of Pressed Steel Co. Ltd.
Radiation Ltd.
Simplex Electric Co. Ltd.
Tricity Cookers Ltd.

Only five years ago as few as 8 per cent. of British homes were equipped with a refrigerator. The 1961 position is very different. Today 22 per cent. of our households have a refrigerator. But Britain still has far to go in order to catch up with many other countries in the world.

At the Café Royal last month, one saw how well the design of the latest domestic refrigerator is suited to the modern kitchen, even if the latter is small, old fashioned or irregular in size.

The "Top Twelve" display underlined the 1961 theme "There *is* room . . ." by featuring three kitchen settings with equipment shown in outline—in wrought iron—for the :

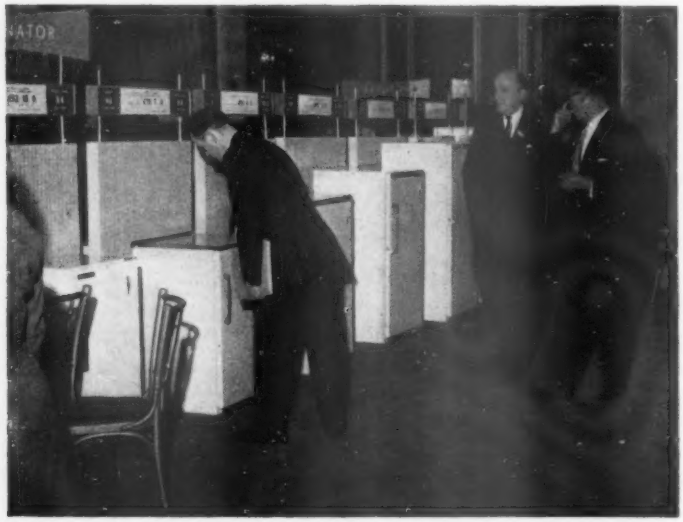
Small unplanned kitchen
Small to medium semi-planned kitchen
Medium to large fully planned kitchen.

Prices, represented by the more 50 models shown, ranged from about £30 to £165 (including purchase tax of 25 per cent), and models on the market ranged in size from cubic capacities of 1·6 c.ft. to about 10 c.ft.

In welcoming several hundred persons to the display, Mr. E. G. Rowledge, chairman of DoRDeC, declared : "Now that the industry has made certain that there is no need for anyone to be without a refrigerator—electrical, gas, bottled gas or paraffin—I will leave you to look for yourselves. I hope you will like the models we have to show you.

"I must say a word about exports. All of us know how important exports are to everyone of us in this country. Three years ago we told the Government that if purchase tax were reduced and hire purchase restrictions were eased—we never asked for them to be abolished—the exports of the domestic refrigeration industry would expand substantially by 1961. We have kept to our undertaking. Last year exports of the domestic refrigeration industry were over 40 per cent. above 1959 and more important, they were the highest ever in the history of the industry. That is the direct result of having a substantial and growing home market. Now in 1961 we are continuing all out with our export drive and we will give the public at home the best opportunity it has ever had to choose from refrigerators of every kind, for every purpose and at even lower prices."

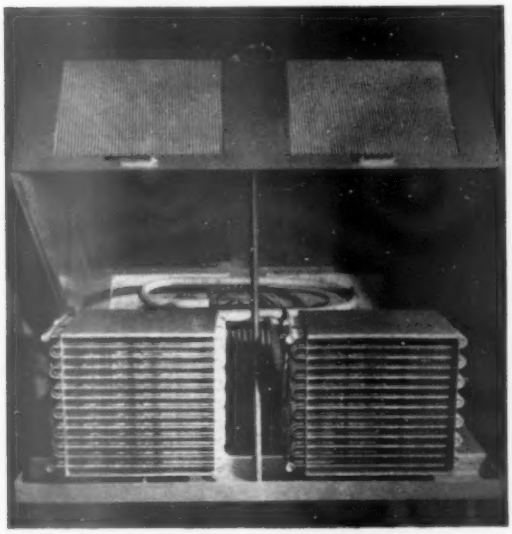
Cape Asbestos thermal insulation materials will shortly be manufactured in Mexico. The Cape Asbestos Co., Ltd., have taken a financial interest in Aislantes Industriales, S.A. de C.V. of Mexico City, manufacturers of foamed polystyrene insulation products and asbestos "Aircell" pipe covering for low temperature work. Early in 1961, Aislantes Industriales will begin manufacture of "Caposite," amosite pipe sections for high temperature insulation. Aislantes Industriales, S.A. de C.V. was originally founded early in 1959 under the corporate name of Frigolit Mexicana, S.A. by Mr. H. Rowe Morris, who is head of the Materiales Aislantes group of companies, the leading manufacturers and contractors for thermal insulation in the Republic of Mexico.



Mr. Morris Craig, vice-chairman of DoRDeC, and Mr. J. Redman, Electrolux Ltd., inspecting some of the exhibits.

DEHUMIDIFICATION PLANT

The control of humidity is one side of storage techniques which, in the opinion of many authorities, has received scant attention. Perhaps the use hitherto of chemicals or ducting in dehumidifying plant has been a deterrent to its widespread adoption. Without these handicaps, portable equipment needing no installation becomes practicable and may be an economic proposition for a much wider range of users. In order to meet this demand a range of " Hygro-Robot " dehumidifiers operating on the refrigeration principle is being introduced and developed by British Sarozal, Ltd. No chemical agents are used in these appliances. In these units air is drawn in at one end by a silent-running fan and passes over evaporator tubes cooled by a compressor refrigerating system. The compressor is a self-contained sealed unit. The condenser of the refrigerating system is located next to the evaporator, so that after the air has been cooled to below dew point and has lost its moisture, it is warmed by passing over the condenser tubes before being discharged. The system is flexible, and provision can be made for extra warming of the air or for further cooling if required. The dehumidifiers operate under automatic control and require no supervision after the conditions it is desired to maintain have been preset. An application of the units which is likely to overcome a long-standing difficulty is dehumidifying in the holds of ships, where changes in ambient temperature during a long passage can lead to heavy condensation. A further application of growing importance is for specialized conditions where products are stored in packaged form in locked stores, often in unheated areas, but must suffer no deterioration. The dehumidifiers might also lend themselves to grain drying without detriment to germination. Another use of the " Hygro-Robots " is for quick and safe drying out of new buildings. The three versions in this range are the 492A for ambients from 53° to 95° F., the A492B for ambients from 41° (37° in a model for ships' holds) to 95° F. (or up to 104° F. in special circumstances) and the A492-S, a special model originally developed for the chocolate and coated paper industries. Dimensions of the unit shown are 3ft. 3 in. wide by 3 ft. high (including height of castor-mounted stand) by 3 ft. 3 in. deep. A ¾ in. outlet pipe is provided for water discharge and is adjustable for direction. Discharge rate (depending on temperature and humidity) is in the region of 17 gal. per 24 hours. Air is circulated at the rate of 63,000 c.ft. per hour. This model is made for the time being for three-phase supplies only and has a consumption of only 1.1kW (the smaller dehumidifiers of the 5055 series, however, are suitable for operation from any single-phase mains point).



British Sarozal Ltd.'s Hygro-Robot dehumidifier which can, under normal circumstances, keep air humidity constant at 40 to 50 per cent R.H. in rooms of up to 52.500 c.ft. (1,500 m³) with its own air circulation of 29,000 c.ft./h.

Lec Refrigeration Ltd. have developed a new fish keeper to add to their present range of refrigerators. This attractive cabinet has a capacity of 13 c.ft. which holds approximately 20 stone of wet fish in sea fresh condition. The Fish Keeper takes the very minimum of floor space, 30 in. by 27 in. and stands 70½ in. high being finished in gleaming white high-bake enamel. Six heavily galvanized roll-out drawers are fitted for easy handling of the fish, each drawer has a tray. Automatic defrosting is incorporated giving the utmost freezing efficiency while a condensation drain disposer removes the water from the interior of the cabinet. Refrigeration is ensured by the Lec hermetically sealed refrigeration system with a very low electricity consumption, which requires no oiling or attention.

* * *

U.S. Refrigerator Exports.— Estimating shipments for the last third of December, Mr. Harvey Williams, president of Philco International Corporation, announced that the number of Philco refrigerators exported from the United States in 1960 would be 53 per cent. greater than the company's exports of refrigerators in 1956, and 14 per cent. greater than refrigerator exports in 1959. These results are contrary to the trend of the American refrigerator industry. On an industry-wide basis, the number of refrigerators exported is down 22 per cent. since 1956 and, based on estimated exports for 1960, it is expected that the decrease from 1959 will be approximately 9 per cent. Mr. Williams attributed Philco's success to a strengthening of the family of overseas Philco distributors, and also to Philco International's policy of manufacturing, in Europe, the sizes and types of refrigerators which appeal to European families. These are shipped from Philco's European sources to the same overseas distributors who sell Philco's American exports. Consequently, Philco overseas distributors are able to offer a mix of American and European sizes and types, giving them an opportunity to appeal to consumers in a wide range of income brackets and with a wide range of tastes in all markets around the world.

* * *

Modern Refrigeration is obtainable from the manager, Maclaren House, 131, Great Suffolk Street, London, S.E.1, at thirty-five shillings per annum post free to any part of the world.

HEREFORD FIRM WITH A WEALTH OF NEW IDEAS

A SPECIALIST engineering firm relatively new to the refrigeration field had an "open day" last month when several developments in cooling and air-conditioning equipment were seen by visitors.

The firm in question is Denco Miller Limited of Hereford, formed about four years ago to explore the industrial applications of the refrigeration cycle. It is specializing in individually engineered units to meet the requirements of industry rather than endeavouring to impose a fixed design which may or may not be suitable for the conditions met.

An associated company is Farvalube Ltd. specializing in industrial centralized lubrication and engineers' manufactures who install the well-known Farval centralised lubrication systems, particularly for steelworks and other heavy industries. Similarly linked is Denco Engineering Services Ltd. specializing in the design, supply and installation of oil circulation, purification and hydraulic systems for heavy industry notably to steelworks and the paper industry. In their turn they also have been associated with the expansion schemes in the steel industry since 1945, as well as highly specialized systems for nuclear power stations and the high speed wind tunnel for the Royal Aeronautical Establishment at Bedford.

The group as a whole is, therefore, concerned with the basic industries not only in the United Kingdom, but, through its subsidiaries and associates, with heavy industry throughout the world.

Particularly interesting is the "Thermorator" capacity controller manufactured by Denco Miller Ltd., in a range of sizes; this piece of equipment can be used both as capacity regulator and/or rapid defrost generator. The introduction of the device widens the application of direct expansion cooling by permitting and controlling wide variations in refrigerating effect of the evaporator.

The device is a positive evaporating temperature controller when used in liquid chilling and similar applications subject to flow variations, so it also provides positive protection to the heat exchanger.

The capacity controller affords the most rapid means of defrosting coolers and without the application of external heat. It thus supports frequent defrost cycles without extending the refrigerating cycle, whilst the clean coil conditions justify close fin coolers, thereby reducing by-pass air and improving the efficiency factor.

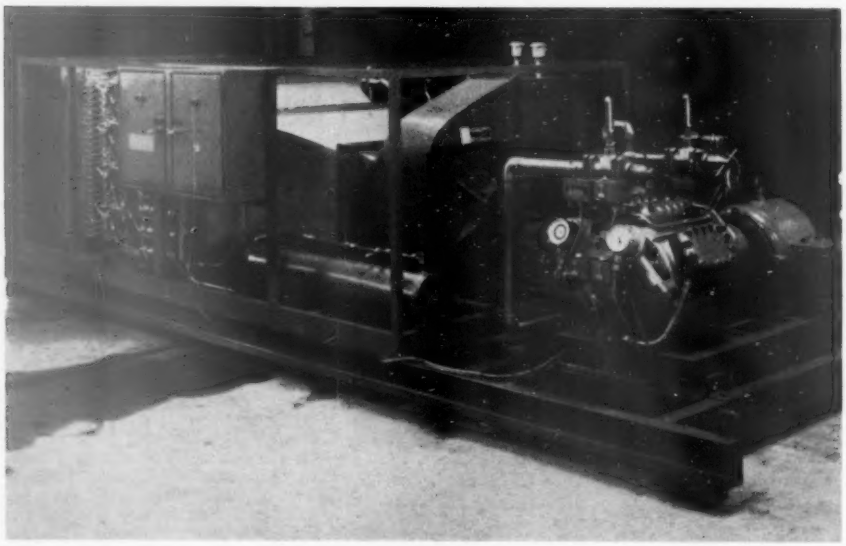
Operation of Thermorator Capacity Controllers

(1) *Systems requiring constant evaporating temperature and regulated by automatic expansion valve* (*see fig.* 1)

Whilst the system is working at normal capacity, the capacity controller has no effect. However, when the load diminishes, and liquid refrigerant spills over, this liquid is vapourised by the discharge gas from the compressor. The controller thus absorbs surplus compressor efficiency under reduced load conditions, and to the full margin of reduction. The controller is particularly valuable when evaporating temperature approaches the freezing temperature of a liquid in liquid chilling applications.

(2) *Systems regulated by thermostatic expansion valve* (*see fig.* 2)

The controller can be used advantageously in such systems which call for close control of relative humidity. Clean coil conditions warrant the use of close temperature difference in high R.H. stores. Circumstances frequently arise when compressor efficiency overtakes the specified duty of the cooler. This results in a widening temperature difference and reduced relative humidity. By in-



Automatic dehumidification plant.

stalling an automatic expansion valve in a by-pass from the liquid receiver to the capacity controller, and by setting this valve to open at the lowest permissible evaporating temperature, temporary surplus compressor capacity is diverted to the controller and desired room conditions are thus maintained. This facility is of great value in applications such as apple stores.

(3) *Hot Liquid Defrosting (see fig. 3)*

To initiate the defrost cycle a solenoid valve in a by-pass line around the expansion valve is energised by a time clock. At the same time the evaporator and condenser fans are stopped (in water-cooled systems an additional solenoid valve closes the water circuit). All the refrigerant in the high side passes through the by-pass circuit and spills into the capacity controller. This component then operates as a thermal energy exchanger, the warm discharge gas evaporating liquid in the low side of the vessel at relatively high temperature and condensation of the hot gas occurs from this latent heat exchange. Warm liquid passes to the evaporator, and heat exchange at this point defrosts the surfaces.

The process is self supporting and cumulative but high side pressures are limited by the rate of flow through the solenoid valve orifice.

The process occupies two to three minutes after which interval normal refrigeration is resumed when the normal distribution of refrigerant in the system has been restored.

In this application the controller is sized in conjunction with the capacity of the evaporator to contain all the refrigerant charge in the system.

The thermostats would be wired to over-ride a self-starting time clock to eliminate unnecessary defrost cycles.

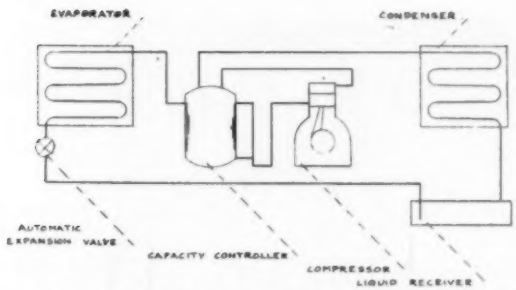


Fig. 1.—Capacity controller used with automatic expansion valve.

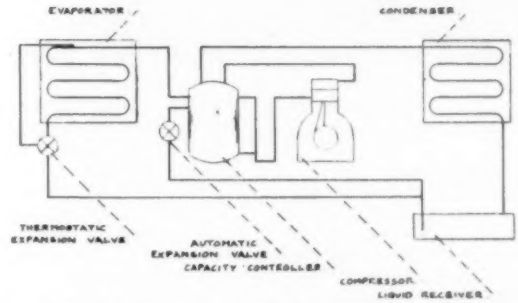


Fig. 2.—Capacity controller used with thermostatic expansion valve.

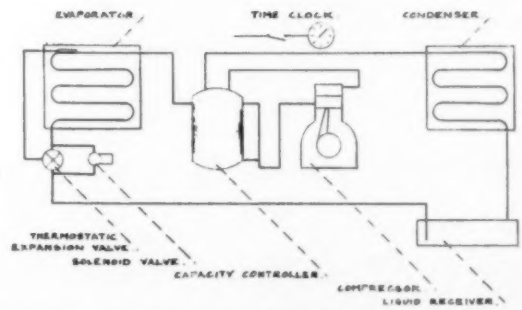


Fig. 3.—Simple circuit using capacity controller for rapid hot liquid defrost.

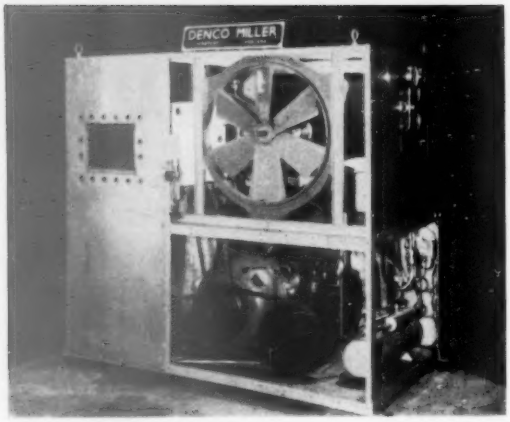
Other plants on show included :—

(1) *Automatic Electronically Controlled Air-Conditioning Unit*

The example had been designed to maintain conditions of 70° F. ± 2° F. and 50 per cent. R.H. ± 5 per cent. in a room housing a computer. Total cooling duty equalled 198,000 B.t.u. per hour and the equipment included a three-step capacity compressor and five-step electric heating with pan type humidifier. In this application the heaviest load was concerned with heat associated with power to the computer. Nevertheless, there remained the need for control of relative humidity conditions and the availability of a heating cycle when equipment load diminishes. To provide full automatic control of all duties, signals from temperature and humidity sensing elements must produce a response proportional to any deviation from specified conditions. The demonstration showed the response to such deviations.

(2) *Automatic Low Dew-point Dehumidification Plant.*

This example had been designed for, and successfully operated in, the clean conditions zone of nuclear power stations under construction. The equipment was designed to maintain average relative humidity conditions in winter of 20 to 25 per cent. at 60° F. and 30 per cent. in summer at 65° F. At this latter temperature the plant had a moisture removal capacity of 120 lb. water per hour. Its function is to maintain a constant supply of filtered, moisture-reduced air within such vessels as steam raising units and reactors throughout the period of construction, thereby ensuring that components shall remain bright and free from rust. The equipment is moved at times on site and must therefore be extremely robust, packaged and protected from weather. Commissioning must be reduced to the simplest functions. The outstanding feature of the equipment is its ability to maintain a clean, virtually frost-free evaporator despite the low evaporating temperature (12° F.). This is achieved by the application of the



Crane cab cooling unit.

Denco Miller capacity controller as a defrost heat energy convertor.

(3) *Crane Cabin Cooling*

These units are provided in capacities up to approximately 30,000 B.t.u. per hour in ambients of 120° to 150° F. and are designed to maintain comfortable temperatures under conditions between normal ambients and the fierce heat in the vicinity of such installations as soaking pits etc. Features are—rugged, packaged construction with clean lines, single drive for compressor and fans, single shot Farval "Multival" lubrication and patented capacity control. The units are readily fitted to new or existing crane cabins or mill pulpits and for the former application, they have been designed to withstand considerable shock and vibration. The extra large condenser permits air cooled operation under high ambient conditions.

(4) *Constant Dew-point Compressed Air Drying*

The example demonstrated a unit suitable for drying 400 c.f.m. at 35 to 40 p.s.i. to a dew-point of 36° F. under pressure (equivalent to 8·4° F. at S.T.P.). It is generally desirable that moisture should be removed from compressed air to a dew-point below that which is likely to be reached at the points of distribution and application. Moisture separation by refrigeration in a second stage heat exchanger provides two advantages—(1) The dew-point can be selected to provide a continuous process uninterrupted by cycles of chemical regeneration. (2) By a system of contra-flow in the primary stage the air to the second stage is pre-cooled to reduce load on the refrigerating plant, and the air to the distribution lines is re-heated.

Dew-Point Selection

The selected dew-point of 36° F. under pressure has an equivalent substantially low under S.T.P. conditions. (For example, the unit demonstrated is designed for air at 35 to 40 p.s.i. The equivalent dew-point at S.T.P. would be 8·4° F. If the duty were for air at 100 p.s.i. the equivalent dew-point at S.T.P. would be minus 6° F.). The selected dew-point, 36° F. or just above freezing point, permits constant precipitation of water.

COOLING UNIT for Broads

As mentioned in our last issue, each of Blakes' boat yards on the Norfolk Broads now has one, two or three freezer cabinets illustrated above (depending on the density of traffic on that part of the water) each of which has a capacity of 49 ice bottles for boat larder cooling.

REFRIGERATOR CARS FOR FRUIT CARRIAGE

Since 1958 there has been a 50 per cent. increase in the tonnage of fruit and vegetables transported by rail from Spain to other European countries in the wagons of the Spanish company "TRANSFESA." These vehicles, which were introduced in 1951, are fitted with interchangeable axles to overcome the difference in railway gauge between Spain and the rest of Europe. The avoidance of trans-shipment at the Franco-Spanish frontier, speedier transits, improved techniques in standards of refrigeration, increased living standards in most European countries, greater productivity and liberalisation of exchange controls all contributed to the constant growth of traffic which took place between the years 1951 and 1957 and it was anticipated at the time that this growth would continue. Such was the confidence of Transfesa in the future that it had ordered the construction of one thousand more wagons, all to the English loading gauge.

New Family-Size Slimline Refrigerator with a Deep-Cold Freezer

Twelve pounds of frozen foods can be kept up to three months in the full-width deep-cold freezer of English Electric's latest table-top refrigerator of 4·1 c.ft. capacity.

The square-cut Slimline 41 is finished in white or cream with a neat charcoal grey trim on the front of the cabinet, and has an attractive interior colour scheme of Glacier and Arctic Blue. Other refinements are an interior light, separate meat and salad crisper drawers, and the refrigerator is mounted on rollers. The retail price is £63 gns. (including purchase tax of £10 4s. 6d.).

Construction Cabinet

Welded high quality steel, rustproofed and finished in stoved synthetic enamel; thermally insulated with glass fibre ; mounted on two rear rollers. Vitreous enamelled removable tabletop at standard 36 in. height has a raised back edge to prevent spills, and is heat and stain resistant. The door is hinged on nylon bearings, opens within cabinet width, has a pull-open latch, and chromium-plated handle. Door storage provides a large dairy-keeper with spring-loaded pull-down door ; two shelves for small and tall bottles ; a third shelf with removable plastic egg-holder for 15 eggs. A plastic mat protects the bottom shelf from bottle scratches.

Refrigerating Unit

Hermetically sealed reciprocating compressor charged with refrigerator's lifetime supply of oil and " Arcton-12 " refrigerant. Induction motor has automatic thermal

Refrigeration Follies —No. 3

" Of course, we could keep the doors and windows closed and install air conditioning."

overload protection. To ensure quiet operation, the compressor and motor are internally spring-mounted. Wire and tube condenser is mounted vertically at rear of cabinet. For tropical countries a special higher-rated unit is available.

Measurements

Gross capacity :	4·1 c.ft.	Freezer capacity :	·35 c.ft.
Shelf area :	7·5 sq. ft.	Height (to table-top) :	
Width :	21 in.		36 in.
Depth :	22¼ in.		

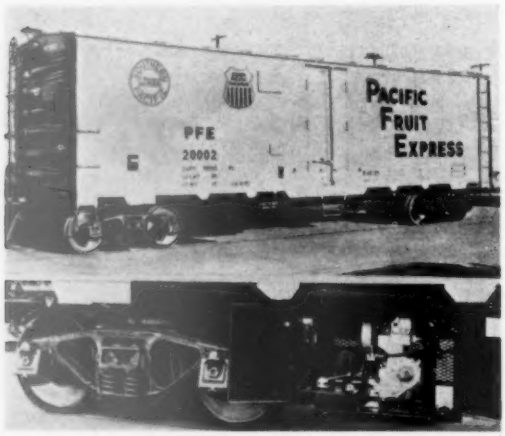
BRITISH WIN REEFER-CAR ENGINE CONTRACT

BREAKTHROUGH IN AMERICAN MARKET

PETTERS Ltd., of Staines, Middlesex, are to supply 500 of their type PC1 engines to Preco Inc., of Los Angeles, for use in a new temperature control system for America's rail refrigerator wagons.

The PC1, a single-cylinder, air cooled diesel developing 5 b.h.p. at 3,000 r.p.m., has been selected in the face of severe international competition as the power unit for the new system, known as "Cargotemp." The present method of cooling on America's refrigerator wagons relies on small alternators driven from the bogie wheels to power the electric fans, so that when the train stops the fans cease to operate. The Cargotemp installation consists of a circulating fan and three thermostatically controlled cooling fans, powered by a self-contained diesel alternator set located under the wagon.

The big advantage of the new system is that the fans operate at a constant speed, instead of depending on the train's movement, which means that perishable goods can



even be held for several days at their destination to take advantage of fluctuating market prices. There is also a 10 per cent increase in payload, since the increased air circulation and controlled air temperature halves the quantity of ice that need be carried.

Initial users of the Cargotemp system are the Pacific Fruit Express Co. of San Francisco, America's largest refrigerator car operator. Petter engines have been used in much of the testing of the Cargotemp system carried out by Preco over the past three years, and early in March, a Petters service supervisor will begin a 10,000 mile tour of the U.S. railways to give instruction in the maintenance of these engines.

It is estimated that there are now some 30,000 to 40,000 refrigerator wagons in America, and the order for the first 500 Petter-engined units for service on the U.S. rail system represents a significant break-through into a vast potential market.

Greetings to Professor Plank

PROFESSOR RUDOLF PLANK was 75 years of age on March 6. He is one of the leaders in the field of international co-operation for the advancement of the science of refrigeration.

Professor Plank is well known in this country and in the overseas dominions. He has contributed to the Proceedings of the Institute of Refrigeration and was a member of

the International Congresses held in London in 1924 and 1951. He attends most of the meetings held under the auspices of the International Institute of Refrigeration. At the 10th International Congress staged in Copenhagen, he was elected president of the general conference of the Institute. His knowledge of Russian was most helpful when the technical board and some of the commissions of the Institute met in Moscow.

In Germany, when head of the Kältetechnisch Institut der Technischen Hochschule, Karlsruhe, he brought that Institute to the forefront of research establishments.

All Professor Plank's friends trust that he had a very happy birthday and wish him many more years of activity in the interests of refrigeration.

EZER GRIFFITHS.

A new London Chamber of Commerce booklet on air freight services has been published. Entitled "Goods by Air" it is intended as an elementary guide for the business-man who has not previously made use of air transport and a handbook for those with some experience. It deals briefly with such subjects as the difference between scheduled and charter services, explains the basis for cargo rates and gives details of the connecting road and rail services which operate between the major airports and the rest of the country. In addition it also includes a comprehensive list of the specialized authorities in the field of air transport such as airlines, forwarding agents and air brokers. Copies of the booklet, price 2s. 6d., post free, are available direct from the publishers, Chamber of Commerce Publications, 68, Queen Street, E.C.4, or from any Chamber of Commerce affiliated to The Association of British Chambers of Commerce.

Refrigeration Association in East Anglia

A NEW Association which is to be called The East Anglia Refrigeration Association was formed at a meeting which was held at The Bell Hotel in Norwich last month. The meeting was opened by Mr. A. S. Alexander, chairman of Westwick Frosted Products and of the Ross Frozen Food Division. He acted as chairman for the first meeting of the refrigerationists representing many firms from Norwich, Yarmouth, Lowestoft, Fakenham, Thetford, Bungay and King's Lynn. The meeting was well attended by some 50 members of the refrigeration industry.

Mr. V. S. Meadows, director of Westwick Frosted Products, welcomed three guests who had attended the meeting from London, Mr. L. R. Meyer, member of the Institute of Refrigeration; Mr. G. E. Steggle and Mr. Gorringe representing the Refrigeration Servicemen's Association. The officials who will serve on the committee of this new Association were elected:—

President: Mr. A. S. Alexander, chairman of Westwick Frosted Products Ltd., Westwick.

Vice-President: Mr. M. E. Edwards, electrical director, Mann Egerton & Co. Ltd., Norwich.

Chairman: Mr. V. S. Meadows, director, Westwick Frosted Products Ltd., Westwick.

Vice-Chairman: Mr. G. F. Leech, refrigeration manager, Mann Egerton & Co. Ltd., Norwich.

Secretary: Mr. R. Fiske, draughtsman, Westwick Frosted Products Ltd., Westwick.

Treasurer: Mr. P. Coull, manager, Williams Cold Storage Ltd., Thetford.

Committee Members: Mr. G. Williams, managing director, Williams Engineering Co. Ltd., Thetford; Mr. R. Adams, chief refrigeration engineer, Henry Sutton Ltd., Yarmouth; Mr. W. Leggett, director, Met-Anglia Ltd., Fakenham; Mr. R. Dale, service manager, Girdlestone Refrigeration Ltd., Norwich; Mr. R. Gardiner, Birds Eye Ltd., Yarmouth; Mr. D. Wilson, first refrigeration engineer, Westwick Frosted Products, Westwick; Mr. D. Ruddock, director, Pitkin & Ruddock Ltd., Beccles.

Mr. Alexander expressed the hope that this new Association would be well supported by the refrigeration engineers in this area. Meetings will take place monthly when lectures will be given by qualified people on refrigeration subjects and it is hoped that a little later on a technical training course for people coming into the refrigeration industry can be arranged. The annual subscription to become a member of this new Association is £1 and it is hoped that, where apprentices are concerned, firms employing these boys will assist them to take advantage of this education facility. The papers presented and lectures given will cover a very wide field in refrigeration and should be of interest to everyone concerned with the various aspects of refrigeration.

Thermo King Refrigerated Ice Cream Vehicle

J. LYONS & COMPANY have recently included in their depot fleet of bulk, feeder, refrigerated vehicles this 10-ton capacity trailer which has a Thermo King mechanical, self-contained, complete refrigerating unit model RL20 installed.

The payload which is pallet loaded on to Marco rollers, consists of 2,100 gallons of ice cream which is carried at an operative temperature of − 5 to − 10°F.

The vehicle which is based at one of the Lyons factories in Greenford is used for long distance delivery and is one of the largest refrigerated articulated vehicles in the country.

Although the Thermo King unit has been in service for only a few months, it has already proved highly efficient. The Thermo King cuts defrosting time greatly, for the unit carries out this function automatically every four hours. During defrosting no warm air is circulated to the goods container since the cooling coils are isolated by a solenoid-operated shutter while the ice is being melted.

The refrigerated body on the Crane semi-trailer was constructed by Normand Limited. The dimensions of the body are as follows:—

Over-all Dimensions	*Internal Dimensions*
Body length 26 ft. 6 in.	Length 25 ft. 0 in.
Body height 12 ft. 10 in.	Height 6 ft. 7½ in.
Body width 7 ft. 8 in.	Width 6 ft. 4 in.

CECOMAF Conference

MEETINGS of the European Committee of Manufacturers of Refrigeration Equipment (CECOMAF) and of the European Economic Committee of Manufacturers of Refrigeration Equipment, were held recently at Wiesbaden.

Taking part in these meetings were German, English, Belgian, Danish, French, Dutch, Italian, Swedish and Swiss delegations. These two committees met at the General Assembly on the 24th for COMAF and the 25th for CECOMAF.

At the time of the general assembly of COMAF, held under the presidency of M. Faure (France), a plan for common customs' rates was discussed and approved by the delegates of the six countries of the Common Market. This meeting also allowed an exchange of views on collaboration between constructors within the framework of the Common Market.

During the general assembly of CECOMAF, the president of the committee, M. Malengret Lebrun, gave a report on the 1960 period and the presidents of the commissions gave an account of the activities of their groups.

The newly elected officers of CECOMAF are as follows:—

Honorary President: M. Malengret Lebrun (Belgium); President: Mr. S. Mansted (Denmark); Senior Vice-President: Mr. Wagner (Germany); Vice-Presidents: M. Faure (France) and Mr. K. J. R. Cocke (Great Britain).

The following were the principal points discussed:—

A booklet explaining CECOMAF, its aims and methods of work.

The state of the proceedings with Spain, Finland, and Norway concerning their membership of CECOMAF.

A liaison between CECOMAF and international organizations concerned with refrigeration, I.I.F. (International Institute of Refrigeration), and I.S.O. (International Standard Organization.)

The next meeting was fixed for May in Zurich.

The three commissions of CECOMAF also met at Wiesbaden.

(*continued on page* 268)

R.S.A. NEWS

REFRIGERATION SERVICEMEN'S ASSOCIATION

AT the February meeting of the R.S.A., Mr. C. Sibbett of L. Sterne & Co. Ltd. gave an informative lecture on hermetic systems.

The approach of Mr. Sibbett to the subject was a thoroughly practical one and embodied very many useful hints on the application of hermetic systems.

He began by pointing out that hermetic units fall broadly into two categories, *i.e.* (*a*) High torque start units which are required to start up against unbalanced loads in systems using thermostatic expansion valves. (*b*) Low torque start units, used in systems with capillary restrictors or bleed-type expansion valves.

In this respect a note of warning was sounded. A capacitor on a motor compressor unit does not necessarily mean that it is a high torque start unit.

Range of Machines

There are three further categories into which hermetic units can be subdivided according to application temperature range. These are :—

(1) High back pressure model — evaporating temperature 25° to 50° F.

(2) Medium back pressure model — evaporating temperature 20° to 30° F.

(3) Low back pressure model — − 20° to + 20° F.

Some degree of interchangeability between these three basic models is permissible but if one model is used for an application outside its designed temperature range it does not necessarily follow that it will be properly protected. Further, when using a low back pressure model it is quite normal for the thermal protector to trip on a high load condition.

Mr. Sibbett then outlined a number of precautions which should be followed when installing hermetic units and systems, a full understanding of which will diminish very considerably the number of field returns. These points are summarized under the same headings dealt with by the speaker.

Voltage

It is important to ensure that the available supply voltage falls within the voltage band of the motor selected. To check this it is important to measure the voltage supply *at the terminals of the motor* with a suitable voltmeter. In doing this the voltmeter should be watched carefully as the supply is switched on. If volts, as measured, are on the low side this can be due among other things to excessive voltage drop in the wiring and it should be remembered that more damage is caused to motors of this type by low voltage conditions than by any other cause, despite the fact that there are working limits of the order of 5 to 6 per cent. above and below the machines voltage band, *i.e.* a 210 to 240 volt motor will in fact usually work satisfactorily on a voltage band of 197 to 250 volts. Where other equipment is operating from the same supply the worst possible conditions should be envisaged, *i.e.* all machines should be operating, when checking voltage at any one particular motor. A final word of advice—every service engineer should carry a voltmeter, preferably one showing amps and resistance, in addition to volts.

Siting

There must be a reasonably good current of free circulating air passing over a motor compressor unit, a fact which is not always remembered when considering suitable siting. This also implies that there should be a good exit for this air to pass through as quickly as possible.

Installation

The standard of dryness in hermetic units these days is extremely high and this standard is maintained in production by frequent batch testing. In the case quoted by Mr. Sibbett the maximum permissible amount of moisture in a unit after a three hour pull on vacuum and with the winding heated is 0·18 gm. although half this figure is in fact achieved in practice.

Piping Up

There should be as few joints as possible and piping up must be carried out as quickly as possible. If a drier is installed this must be fitted last and warmed before fitting, if facilities for this exist. Check for leaks, preferably with an electronic leak detector. The correct way to do this is to build up pressure within the system by using a mixture of refrigerant and oxygen-free nitrogen and go over *all* joints very carefully, including welds. The refrigerant/nitrogen should then be removed by blowing or purging or by means of a vacuum pump which should have means of measuring the vacuum being pulled. Under no circumstances should the compressor be used for this purpose owing to the danger of losing lubricant.

Charging

Commercially available refrigerants have a moisture content these days of less than 10 parts per million and all equipment, including service cylinders, used in charging a system *must* therefore be kept absolutely dry and clean.

Application

As is no doubt well known to all service engineers, with a high torque start unit with T.E.V. a liquid receiver is essential, whereas with a low torque start unit fitted with capillary or bleed valve no liquid receiver is fitted. Charging should be carried out in maximum ambient temperature (90° F. in temperate climates). The system should be pumped down (from both sides of capillary or expansion valve, if possible) to 100 microns. The vacuum should then be broken fast with a little gas (say, 6 oz. approx.) and the machine should be run in 90° F. ambient until the compressor is warm. Then charge up slowly to a frost line. This procedure will ensure that the system will not be overlooked in service.

If a production run of systems are being charged, it is not necessary to carry out the above procedure on each but the weight of charge used in the first one is determined and the same amount is charged into each succeeding system without necessarily doing this in an ambient of 90° F. There is a big advantage in using a suction line accumulator fitted at the highest point possible—this acts as a surge tank and gives a considerable amount of latitude in charging, but with a low start torque unit there is no reserve of refrigerant and one must therefore be very sure that there is no leak at all.

QUIZ FOR SERVICEMEN

1. **On a gas cylinder, what colours denote CO_2, NH_3, CH_3Cl, SO_2, "Arcton-12" and "Arcton-22"?**
2. **What is the purpose of a compressor?**
3. **Why is an expansion valve used?**
4. **What is superheat?**
5. **On hermetic units, why is an overload fitted to the motor?**
6. **Describe sublimation and give an example.**

Answers to the above should be concise; indeed, each question can be answered in under 100 words and, in most cases, in under 75 words.

This feature will appear monthly throughout 1961 and possibly beyond. In July, a book prize will be offered to the person submitting the most correct answers to instalments 1 to 60.

Replies should be addressed to the Managing Editor, "M.R.", 131, Great Suffolk Street, London, S.E.1.

FORTY-FIFTH ANNUAL PHYSICS EXHIBITION

SOME diverse applications of refrigeration were on display at the 45th Annual Exhibition of the Institute of Physics and the Physical Society, held last month at the Horticultural Hall.

Townson and Mercer Ltd., showed a low-power sealed unit, suitable for use in a laboratory to cool a thermostat bath below room temperature. It has sufficient power to maintain a difference of 5° to 10° C. between the ambient temperature and a reasonably insulated thermostat bath of not more than seven gallons capacity.

The unit is mounted on a cast-iron base with curved shut-iron sides. The ends are open to give adequate ventilation and a small shaded pole induction motor is situated above the compressor unit driving a fan to cool this unit and the Condenser coils The overall size is 26 in. high by 21 in. long by 9 in. wide, voltage is 210/240, 50 cycles, a.c. only ; consumption is 230 watt ; total weight 50 lb. ; finish, stoved grey enamel.

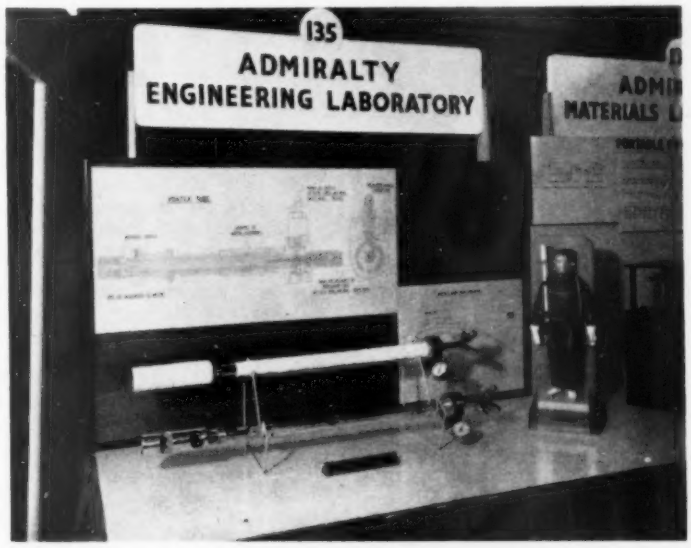
The "Vortex tube" shown by the Admiralty Engineering Society was designed by them to cool the air supply to a ventilated suit. The cooling operation depends on the fact that there is an energy variation across the radius of a forced vortex. When the air is rejected into the swirl chamber it flows in a free cylinderical vortex towards the hot discharge end of the tube. There is no air in the core of the vortex due to the centrifugal action of the high speed swirl.

As the air progresses along the tube, the viscous friction of the gas changes the character of the flow to that of a forced vortex with the resultant energy gradient over the radius. The flow also fills the entire cross-section of the pipe, and by suitably throttling the hot discharge, some of the air from the cool central core is forced back along the tube inside the main vortex and then discharged via the cold air orifice.

Panax Equipment Ltd., have designed a refrigerator for use with the scintillation counter type SC-LP. It contains a sealed refrigerator unit incorporating compressor, condenser and evaporator which can be removed as one unit from the cabinet for servicing.

A. Gallenkamp & Co. Ltd. and J. W. Towers & Co. Ltd., have an automatic standard distillation apparatus with refrigeration unit, designed to avoid the routine distillation tests to Institute of Petroleum and A.S.T.M. specifications for gasoline, aviation and motor fuels, gas oils and fuel oils, etc.

The automatic standard distillation apparatus originally developed by Shell has now been expanded and includes a refrigerator unit which is used to cool the condenser tank of the apparatus for the distillation of materials having highly volatile fractions. The recording and collection section of the apparatus automatically records the correction temperature, the initial boiling point and the time taken to reach it, the vapour temperature against volume recovery curve, the time taken from the initial boiling point to final heat adjustment, the final boiling point and the time taken to attain it, and finally the total recovery.



Demonstration of the vortex tube principle.

A wide range of **Chrysler** Airtemp refrigeration and air-conditioning equipment particularly suitable for use in the hotel and catering trade, and now available in this country for the first time, was featured on stands 102, 103 and 104 by Kerr-Shaw (St. Anne's) Ltd., main Airtemp distributors, at the Northern Hotel and Catering Exhibition at Olympia, Blackpool, last month. Among the equipment shown were room and packaged air-conditioning units, compact water chillers and gas- and oil-fired furnaces. Several items of equipment were operating throughout the show.

* * *

Thermo-King Transport Refrigerators. Substantially reduced prices of Thermo-King transport refrigerators have been announced by Petters Ltd., a member of Hawker Siddeley Industries, as a direct result of increased production at their Hamble factory which manufactures these units under licence from the Thermo-King Corporation of America. The Thermo-King transport refrigerators are designed for mounting in front of the vehicle body, with the evaporator section self-supported inside the vehicle, and are capable of controlling temperature within close limits. Components and sub-assemblies are interchangeable with the American-produced Thermo-King units now operating in this country and overseas.

COMMERCIAL AND INDUSTRIAL SECTION

Manufacturers' and Distributors' News

Dr. A. J. Barnard has recently been appointed chief engineer of J. & E. Hall, Limited. Educated at Sutton Valence School (1934-42), Woolwich Polytechnic (1942-45) where he took a B.Sc.Hon. Mech. Eng., and Imperial College, London, (1947-50) where he took a Ph.D. in chemical engineering, Dr. Barnard

Dr. A. J. Barnard.

commenced his pupilship at Hall's in 1942. In 1953 he was appointed head of the research and development department of Hall's. He spent eight months from 1956-7 with Hall's Canadian branch and in 1957 became personal assistant to the chief engineer. His appointment as chief engineer was made in October 1960.

* * *

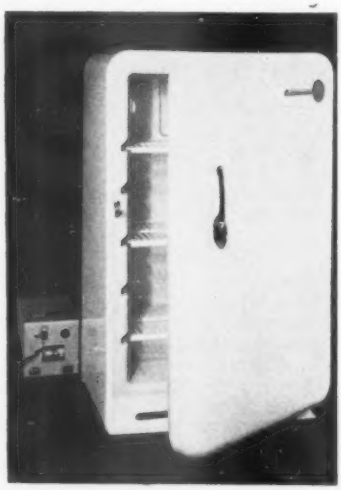
Stand No. 19 at the forthcoming International Refrigeration and Air-conditioning Exhibition will be occupied by **Zero Electric Ltd.**, Walsall, well-known Midland wholesalers, in conjunction with Messrs. Otto Egelhof of Stuttgart and Contardo of Milan. All report considerable expansion progress during 1959 and 1960, and to cater for present and future demands additional accommodation of over 7,500 sq. ft. ground floor area has recently been acquired in Walsall. Zero Electric Ltd's. policy from its inception in 1946 has been to specialize in handling and stocking only one maker's product in any particular line, thus allowing for concentration of effort, simplification of stocking and ability to carry adequate stocks of all products handled to ensure that off-the-shelf delivery can always be maintained. The industry generally has also accorded a very warm welcome to the Egelhof and Contardo products. Messrs. Egelhof will be displaying a full range of the existing valves offered by them to date, together with new models with flange type fittings and a wider range of distributor heads. Messrs. Contardo have not only restyled their existing range of forced draft evaporators, but are also introducing a new version of the hot gas defrosting cooler, to be styled and jet-o-matic, and will shortly be offering an electric defrost model having a number of novel features incorporated in the design. Zero Electric are the Midland stockists for Messrs. London Fan and Motor Company Ltd., Wilmot Breeden Ltd., Armstrong Cork Ltd., Venner time switches, and Ranco Ltd. and also distribute the entire output for refrigeration quality tubing of Messrs. The Wednesbury Tube Co. Ltd. (a copper tube manufacturer of world-wide reputation), and despite increasing competition from overseas suppliers of the latter product very large stock holding enabling immediate delivery of refrigeration copper tubing has enabled a progressive increase to be made in sales of this product over the past two years.

* * *

NEW BATTERY POWERED REFRIGERATOR

A REFRIGERATOR designed to operate in areas where gas and electricity supplies are non-existent or inadequate has been introduced by Lec Refrigeration Ltd., of Bognor Regis, Sussex.

The refrigerator operates by battery—believed to be the first of its kind—and will remove many hardships from farming folk and householders without main gas or electricity services.



'Lec's new models "Mariner" and "Helmsman" have all the features of the conventional refrigerator, plus portability, complete adjustability from battery to electricity, space saving and an absence of bulkiness. It can fit snugly into any corner without hindrance and can be shifted with the minimum of effort.

The sealed compressor operating "Mariner" and "Helmsman" are equipped with evaporators which are rust- and scratch-proof, and have a very low consumption.

Compact and neat, the "Mariner" —capacity 2 c.ft.—is 27½ in. high by 21½ in. wide and has a shelf area of 3·6 sq. ft.

With a butter and egg rack in the door lining, it has a compartment containing six large plastic pop-out ice cube cups.

The larger "Helmsman," with a capacity of 4·2 c.ft., has been designed to take up as little space as possible. One of the strong points of this model is its shelf area—6·7

sq. ft.—with multi-adjustable shelves giving full storage capacity.

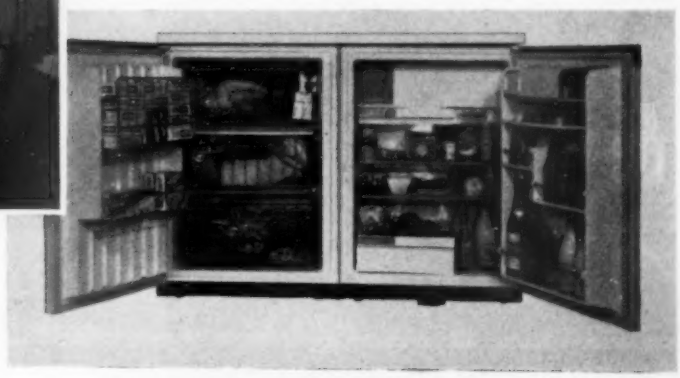
The Lec Transvertor, for use with both models, measures 13 in. high by 7 in. wide by 7 in. long; d.c. input must be specified, as the 12 volt equipment will not suit 24 volts, and vice versa. As an extra, a selective switch can be fitted that will operate from a standard a.c. electricity supply.

* * *

New Kenwood Lines.—An entirely new British concept in refrigerator and freezer design is shown in the latest models marketed by Kenwood. This company has now produced a free standing table-top height refrigerator together with a home freezer of similar design. These may be bought separately or together and when used in conjunction, apart, side by side, or one on top of the other, form a unique combined refrigerator and freezer unit. The overall height of each unit is 36 in., including the optional 2-in. thick working surface table-top. The units can be placed together and covered by a single table-top, or a separate table-top on each piece. The doors can be placed on any side of the units and open within the width of the cabinet and are prevented from swinging beyond 110° by a special stop device. Two other new Kenwood lines. The HR52A refrigerator has two full-width shelves, a third half-shelf and a large vegetable container on the floor with shelf space alongside for up to five pints of milk. The inside of the door will hold dairy produce and tall bottles. Their new home freezer, the HF42A, will hold 1 cwt. of frozen food. It has doors opening sideways like a cupboard with two plastic-coated wire dispensers for storing frozen foods. The refrigerator sells at 67 gns. without table-top and 70 gns. with table-top. The home freezer costs 73 gns. without table-top and 76 gns. with table-top.

The Seventh International Packaging Exhibition.—In 1953 it was estimated that British industry spent over £300,000,000 a year on packaging; by the end of 1960 this estimate had risen to some £600,000,000. The growth and development of packaging techniques throughout the world is perhaps most clearly reflected in the rapid expansion in both size and importance of the International Packaging Exhibition. The seventh "I.P.E." will be held at Olympia, London, from September 5 to 15, 1961, and once again there is an increase in floor area and (300,000 sq. ft.), more than 300 firms will be showing packaging materials, containers, machinery and equipment.

The Kenwood Home Freezer. Door can be placed on either side of the unit.



The new Kenwood refrigerator shown together with their "Home Freezer." These may be bought separately or together and may be used side by side or one on top of the other.

During the last 40 years, **Dewhurst and Partner Ltd.**, have built up a formidable range of pump designs to suit the various pumping industries—land drainage, refrigeration, sewerage, water supply, oil pumping, the chemical world, etc. Refrigeration plants from the smallest air cooled system to the several-acre cold store all employ pumping processes, and "Dupar" can cope with all these. Equipments supplied include multi-motor panels over a 100 ft. long, controlling conditions in over 1,000,000 ft. of storage space, and single motor starters. An illustrated brochure giving full details is available on request.

* * *

Prestcold have introduced the "New Promoter" a frozen food sales cabinet to this country. Among its features are : non-misting display window—positive controlled circulation of cold air around the entire stock—automatic defrosting—clean, frost-free easy-to-serve sales space plus a Prestcold super presmetic unit. The cabinet is completely self-contained, easily installed with no drain connexions required. It is completely automatic in operation, including automatic defrosting. Positive controlled air circulation, coupled with the large non-misting display window, ensures sales compelling mass display of frozen food packages at the correct temperature. The "New Promoter" maintains a temperature of +5° F. and below in ambient temperatures up to 80° F. In fully loaded cases, more than 90 per cent. of their contents are maintained 32° below freezing point. The overall length is 65 in. the overall depth 32⅞ in.

A practical means of using the energy extracted from one area such as a larder or even the earth, in order to provide heating in other areas, has been developed by Mr. Vernon Mills. The "**Jonmil**" is a small heat pump which provides a cool room with freezing chamber, whole house heating and domestic hot water supply for little more than the normal cost of any one of those services. Heat is taken from the larder, which is thereby turned into a fully regulated cooling cupboard with a freezing chamber, and from the garage. It is then pumped around the house to provide a constant, thermostatically controlled temperature in each room as well as a hot water supply Mr. Mills tells M.R. The cooled larder space contains one heat extractor and supplementary extractors are located elsewhere—for example, in the garage. The condenser, or heat generator, is located in the main unit and the operating motor and compressor are combined in a sealed-in unit. The compressor unit and blower motor consume approximately one unit of electricity per hour on continuous operation. The supplementary air heating element consumes three units of electricity per hour when on maximum output.

* * *

Parnall & Sons Ltd., announce details of two new vacuum sealing machines which they are handling. The "Rilpack" is specially designed for sealing nylon films, but is also ideal for use with any other thermoplastic material. This machine, working on the visible vacuum chamber system, accommodates five bags of 4 in. wide by 10½ in. long at a time. It utilizes a method of exchangeable loading plates enabling reloading to take place in parallel with the automatic evacuation and sealing sequence. Its distinctive features are: exact adjustment of impulse intensity, heating and cooling times ; automatic cut-out switch; easily exchangeable welding strips; vacuum chamber can be tilted; pilot lamp control of impulse and cooling times; electronic counting device; built-in generator; automatic welding control with pressure gauge; height adjustment of plate loader.

PRESTCOLD "NEW PROMOTER." A new conception in frozen foods sales cabinets is offered by Prestcold with their newly introduced "New Promoter" cabinet. Here is Mr. C. V. Jones, Prestcold's recently appointed Home Sales Manager, showing interesting features of the new model to some of the top members of the Prestcold sales organization. Over 100 sales executives travelled to the factory at Swansea from all parts of Britain for the special preview.

COMMERCIAL AND INDUSTRIAL

Bowyers (Wiltshire Bacon) Ltd., new insulated van have recently entered into service this Mann Egerton insulated van body on a Morris three-ton forward-control chassis. This vehicle is being used for the transportation of frozen food at temperatures of 0° F. and below. Refrigeration is supplied by a Thermo-King mechanical refrigeration unit model No. M20D which is fitted with automatic temperature control and an aluminium high power compressor. Thermo-King is the refrigeration division of Petters Limited, a member of Hawker Siddeley Industries.

* * *

The new depot which **T. Wall & Sons (Ice Cream) Ltd.** have opened at Swanston's Road, Yarmouth, is capable of storing a 1,000,000 portions of ice cream. The depot will serve a 600-square-mile coastal area of East Anglia—a most popular summer holiday resort. To meet the tremendous increase in the demand for the company's products during the summer, the depot staff of 10 is doubled, and 10 supply vans, six more than in the winter, are kept busy. The company's district manager, Mr. S. W. O. Wright, claims that in a recent survey carried out among housewives by the National Milk Publicity Council, it was ascertained that 64 per cent. prefer Wall's ice cream.

* * *

New Thermo King equipped Morris 3-tonner.

MORPHY-RICHARDS (Astral) Ltd. are introducing a square-lined 3·5 c.ft. "Table Top" refrigerator for the 1961 season. The retail price of £44 2s. 0d. presents a new, low pricing level for this type of domestic refrigeration.

It will be listed as model A.350 and the breakdown of the retail price of £44 2s. 0d. is net list £37 3s. 4d. plus £6 18s. 8d. P.T. The gross capacity is 3·5 c.ft. (3 c.ft. net).

The A.350 has a vitreous enamelled working surface with a splash guard at the rear. The door is magnetic and is fitted with an egg rack, a large butter and cheese compartment with Perspex sliding doors, and two adjustable shelves for storing jars, and milk bottles. On the standard model the door opens from left to right, but the alternative opening will also be available. Adjustable feet are fitted for levelling the refrigerator on an uneven floor.

Including the door storage, the A.350 has a shelving area of 7·1 sq. ft. There are three adjustable shelves, chrome-plated with a gilt trim. The cooling unit stores up to 15 lb. of frozen foods. Three ice-trays are provided for making 36 cubes (1·65 lb. of ice). A lever is supplied for removing the ice-trays. A polystyrene chiller with a lid that can be used as a drip tray is also provided. In addition, a large polystyrene drawer is supplied for vegetable and fruit storage.

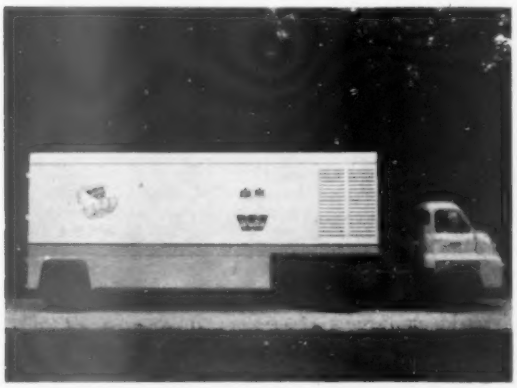
Designed with the space problems of the average kitchen in mind, the A.350's compact cabinet occupies less than 2 sq. ft. of floor space.

The depth is 23·2 in., the width 22·4 in., and the height 35·7 in. (plus 2·35 in. for the splash guard) brings the vitreous enamel working surface to a convenient level. The cabinet exterior is available in either white or cream stove enamel, with a pale blue interior.

The A.350 weighs 110 lb. It is available in four AC/DC voltage ranges—95/100, 110/115, 190/220, or 220/250. The absorption unit has a loading of 120 watts. The control dial, located on the splash guard, has seven settings—"off," continuous maximum operation, and five thermostatically controlled settings.

* * *

Mr. H. Underwood, M.I.EX., has been appointed sales director of **Lec Refrigeration Ltd.,** of Bognor Regis, Sussex. He was formerly managing director of C.E.A. (Distribution) Ltd., of Leicester, for 12 years, and during that time was the largest Lec distributor in the country. Mr. G. A. Farley, at present in the Middle East to launch a new sales export campaign, has been promoted to export sales manager. Mr. Farley is a qualified pilot as well as a refrigeration engineer and most of his overseas trips are made in Lec's Commanche aircraft. Lec have appointed Mr. T. Earl sales supervisor for the southern area of England while Mr. W. Pickup, sales representative in Lancashire, is now sales supervisor for the North of England and Scotland.



LITEX body with forced air refrigeration, supplied to T. Wall & Sons Ltd. for bulk transportation of pork.

Refrigerant Change-over

A Lancashire reader writes to say that he intends to change the refrigerant in his compressor from methyl chloride to "Freon-12." "If I change the oil in the compressor, will that be in order?" he asks, "or are there some other precautions to be taken?

In reply, "M.R." stated: "There are various points to watch when changing a plant from methyl chloride to 'F12,' more especially if the plant is one of 1 h.p. or over because we may then find that the piping which was large enough for the original plant will not be large enough to give good results with 'Freon' and also that the condenser may be on the small side.

"If the condensing unit is a small one with air-cooled condenser and fan the above difficulty may not occur but, in any case, the speed of the compressor must be reduced by about 13 per cent in order not to overload the motor. For instance, if the pulley on the motor is 4 in. diameter it should be reduced to 3½ in. and then the machine should give approximately the same output as before with very little increase in horsepower.

"One important thing is perfect cleanliness and besides changing the oil it might be well to strip the compressor to get rid of any scum or residue from the methyl and then put the whole equipment through the oven to get rid of any moisture, because dryness is so much more important with 'F12.' If no oven is available a very good vacuum should be pumped before putting in the new charge in order to avoid a lot of purging and loss of gas that would otherwise be necessary and if some heat could be applied to the coils and liquid receiver while under vacuum this would help the drying process. Do not be afraid to pump down several times if there is any sign of rise.

"About pressures—on the high side you may expect to get 14 lb. higher than for methyl chloride, say, about 80 lb./sq. in. gauge with air 60°F. or 110 lb./sq. in. in summer with air at 80°F. in an enclosure. On the low side you will get about 21 lb./sq. in. when evaporating at 20°F. (about 6½ lb. higher than with methyl) and 9 lb./sq. in. when evaporating at zero Fahrenheit (about 5 lb. higher than with methyl; at lower temperatures the difference gets less).

"A new expansion valve will be required of course for 'F12,' otherwise there should be no other alteration necessary unless maybe a larger liquid pipe, especially between expansion valve and coil, assuming that this is not a very large compressor. We would not recommend the alteration for anything above 1 h.p. without more particulars about pipe sizes, etc.

"Perhaps you would be well advised to get the little book 'Common-sense Talks on Commercial Refrigeration' which would answer many queries such as we have dealt with above."

CORRIGENDA

"The Graphical Analysis of Air-Conditioning Proposals"

Owing to the incidence of the influenza epidemic, causing depleted staff, several serious errors crept into the article by Mr. H. Mervyn Meacock with the above title in our January issue. Our apologies have been sent to the author.

Figure 1 was reduced in width by bringing the left hand closer to the load scale which invalidated this chart since the scales are only proportional when equidistant—our reduction should have diminished each distance by a like amount. At the same time, the left hand chart was moved up about ¼ in relation to the other two scales.

In the case of figure 4 a and b the result is even more serious, since the two parts are separated so that the "corrected unit cost" scale has lost its meaning. The left hand scale of fig. 4b should be about 3⅛ in. from the corrected cost scale. For vertical position a line drawn through the two 200 marks should just cut the bottom of the "C" in "condensing temperature."

Figure 7 has suffered in the same way as fig. 1 by reduction in width. The actual distance apart does not matter but the ratios must be: Scale A/C=3; C/E=2; E/B=1; B/D=1. Example: In the original the power cost, for a 5,000 ft. circuit carrying 1,000 tons would be about £35,000 whereas the reproduction would give it as about £62,000.

We learn from Jablo Plastics Industries Limited that they supplied the soffit lining for underfloor heating and acoustic tiles for the new National College premises described in our last issue.

CECOMAF

(*continued from page* 261)

The Technical Commission under the presidency of Dr. von Cube (Germany) examined the conclusions arrived at by the members of I.S.O. (International Standard Organization), in the course of the last meetings of the organization held at Paris in October 1960.

Commission for Economic and Commercial Studies: It was decided to form three work groups within the Economic and Commercial Study Commission.

A "Domestic" work group for studying interesting questions relating to domestic refrigeration: M. Germain-Thomas (France).

An "Industrial" group to study interesting questions relating to industrial refrigeration material. Mr. Dell'Orto (Italy).

A "Commercial" work group for studying interesting questions relating to commercial refrigeration material. Mr. Wengler (Germany).

Mr. Dell'Orto (Italy) was elected president of the commission. He replaces Mr. Matteucci (Italy) who resigned.

A questionnaire established by the secretary-general permits the setting up of comparative tables for economic, juridical, and financial matters concerning the commercial activities in Europe.

Finally statistics were exchanged and there was a big interchange of opinions on the evolution of the refrigeration market in Europe.

Professional Study Commission. The professional study committee, under the presidency of M. Pauly (France), has completed the drawing up of a "memo" expressing the wishes of all the professional associations to obtain from their respective Governments details of a plan to train technicians.

The members of the committee also studied a comparative table of the professional study group of cold food in the following countries: Germany, Belgium, France, Italy, Holland, Switzerland, and have decided to organize exchange courses to be held in the countries of members of the committee.

SHOP REFRIGERATION NEWS

WHAT THE VOLUNTARY BUYING GROUPS ARE DOING TO HELP THE INDIVIDUAL GROCER

By Our Special Correspondent

THE installations I am reviewing this month are, with one exception, *all* self-service, and again with one exception, also represent shops or stores or supermarkets that have been converted, modernized or have come into being as a result of the development of the voluntary buying groups.

These are organizations formed either under the aegis of a wholesale grocery company, or of a number of them in co-operation, or else by the banding together of a number of grocers to form a central buying organization.

The main purpose of these groups is to obtain, by bulk buying, more favourable terms from the manufacturers of food products and other merchandise normally stocked by the grocer, thus enabling him to compete on a more equitable basis with the multiple companies whose very large-scale buying gives them the great advantage of substantial discounts. All the benefits of the reduced charges resulting from group buying are passed back to the individual members.

Prestcold frozen food cabinet in Asquith frozen food department at Pontefract.

In the same store at Pontefract is a three-decker cabinet (Prestcold) for dairy goods.

Some groups also provide an advisory service on shop-planning and fitting, and a few cover equipment sufficiently comprehensively to include refrigerated cabinets and cold rooms.

So far as the last-mentioned are concerned, the buying methods of the groups are varied. Some of them have a list of three or four manufacturers who are willing to co-operate by offering special terms, but not all makers of refrigerated equipment welcome this group development. There are a few who do not work with the voluntary buying groups, but continue to supply through their own distributors independently of the groups.

If the grocer buys equipment as well as merchandise through his group, he will, after making his selection, place his order through that group, and then pay with one cheque for all the stock, shop-fittings, and refrigeration equipment with which he has been supplied. Thus, in addition to a reduction in the cost of stock and equipment, he has the benefit of having only one account to pay instead of a score or more.

The shops modernized or newly built under group auspices normally range from medium size to small. An exception to this generality is the supermarket of Mr. P. Asquith at 11-15, Horsefair, Pontefract, Yorks. This covers a ground-floor area of 2,500 sq. ft., and the structure includes three flats at first-floor level. The building occupies a prominent corner site immediately adjoining a bus station, and the complete structure was executed and equipped throughout by D.B.C. (Industries) Ltd., a company operating in conjunction with the group wholesaling division of Danish Bacon Co. (Wholesale) Ltd., which has a retail membership of 1621.

In the selling area there is a low temperature Prestcold cabinet for quick-frozen foods, and a three-decker (two levels refrigerated) cabinet for dairy goods and the like. In the storage and working area there is a cold store covering 170 sq. ft. (1,275 c.ft.) which incorporates a low temperature cold store covering 45 sq. ft. (335 c.ft.) for quick-frozen foods. D.B.C., in fitting out and planning this shop, worked in very close co-operation with the refrigeration specialists.

One of the interesting and important results of the development of buying groups is that, at a time when individual grocers are diminishing in number, new people are being attracted into the trade. By placing themselves in the hands of the expert buyers and planners employed by the groups, these newcomers are able, notwithstanding their inexperience, to start from scratch with a well-balanced, carefully selected stock and a properly equipped, efficiently laid out shop.

An example of this kind is provided by the new shop at Ascot, Berks., of S. & H. Self Service Ltd. Neither of the two owners of this shop had had any previous experience ; but, instead of working on the trial and error principle, they consulted one of the retail sales development executives of Peter Keevil & Sons Ltd.

In 1954, this company, in conjunction with John Wilson & Sons,

Two Eldwood cabinets for frozen foods and dairy goods, respectively, in S. & H. self-service shop at Ascot.

Above: Particularly well equipped with refrigeration (three cabinets by Wathes (Western) Ltd.) is this Spar shop at Weston Favell, Northampton.

Right: Bacon and cooked meats are sold by personal service from a Holcold refrigerated counter type showcase in the same shop.

Below: Recently modernised but not converted to self service, this shop of Adcocks at Peterborough has a cabinet for dairy goods forming part of the counter run, and a wall-type cabinet for frozen foods on the right hand side.

Birmingham, founded the buying group known as the Alliance of Individual Grocers, which operates in Greater London, Southern England, the Midlands, and the Channel Islands. This group has its own shopfitting advisory service, and works in conjunction with a number of refrigerated cabinet manufacturers, one of which is Eldwood Ltd. The two refrigerated cabinets supplied by Eldwood are arranged one alongside the other at the back of the shop on the left-hand side. One is a Harrow low-temperature model for quick-frozen foods and the other a cooling cabinet for fats, bacon, sausages, and cheese.

Another example of a voluntary group shop is the new 900-sq. ft. self-service store of E. Poole & Sons (Northampton) Ltd., at Weston Favell, Northampton. This was opened early in December and consists of the grocery and provisions departments of an old-established general store and sub-post office, on a corner site a few yards away. The wine and spirit confectionery, tobacco, stationery, and newsagency business and post office have been retained in the old shop.

Known as Weston Stores, this business is a member of Spar (Britain) Ltd., which was founded in 1956, operates on a national basis and has no fewer than 33 wholesale members. The unit to which Weston Stores belongs is the

East Midlands Guild of Spar Grocers. The refrigerated equipment here consists of three cabinets, a Frigidaire for frozen foods, a three-decker Frigidaire for dairy goods, and a Holcold for provisions. They were all supplied by Wathes (Western) Ltd., of Leicester, Frigidaire distributors for this district. In this instance, however, neither the refrigerated equipment nor the shopfitting (Shomore by Parnall & Sons, Ltd.) was supplied through the group.

The exception to self-service is the shop of Adcocks (Peterborough) Ltd., which is a conversion of two shops into one to form an L-shaped interior planned for over-the-counter service. The provisions cabinet is incorporated into the counter run, and set back at the end of the run of Shomore wall fittings on the right-hand side is a low temperature cabinet for frozen foods. Both are Frigidaires, installed by Howards Refrigeration Ltd. of Luton. This shop is a member of V.G. Grocery Services Ltd., another group organization with a national distribution.

Above: In a distinctive setting with a vertical emphasis is this three-decker Levin cabinet in Clarke's self-service shop at Bedford.

Left: Seen from a diagonally opposite direction in the same store is the frozen food cabinet (also a Levin) partially recessed into the wall fittings.

The exception to group trading is the shop of J. Clarke & Son, 13-15, Harper Street, Bedford. This is a fairly large self-service shop converted in very old premises. It has a three-decker Levin cabinet for dairy goods in a distinctive setting at the back, and a frozen food cabinet of the same brand partially recessed into the wall-fittings a few feet away on the other side.

Polypenco Limited, 68-70, Tewin Road, Welwyn Garden City, manufacturers of engineering plastics including nylon, "Fluon" and "Penton," announce a complete range of nylon tubes designed to extend the availability and uses of nylon bearings in industry. The high cost of larger nylon shapes has hitherto prevented the use of nylon for bearings in the general engineering industry. "Polypenco" are now able to supply 116 standard sizes of MC nylon tubes, ranging from 2 in. O.D. by 1 in. I.D. to 15 in. O.D. by 14¼ in. I.D. Many sizes are available from stock or can be supplied on a "48 hour service" basis. MC nylon is a specially formulated polyamide. It has been developed particularly for bearing and wear part applications and may be readily machined into components such as bearings, bushings, guides, slideways, valve seats, gears and other wear parts from tubes, plate discs, square, round and hex. rod. Perhaps one of the most attractive features of "Polypenco" MC nylon is the fact that although it is only one-seventh the weight of an equivalent sized bronze bearing, the new material is comparable in price to best quality bearing bronze. Further information is available on application to the company.

The Institute of Refrigeration Bulletin

Institute Headquarters: New Bridge Street House, New Bridge St., London, E.C.4 (CENtral 4094)

APRIL MEETING

AT the sessional meeting of the Institute to be held at 5.30 p.m. on Thursday, April 6, 1961, in the Memorial Building of the Institute of Marine Engineers, 76 Mark Lane, London, E.C.3, Mr. J. A. Cox, associate, will present a paper entitled " Results of practical experiments on relative humidity control."

The following is a summary of the paper :—

The condition requested was to maintain a consistent R.H. value of 100 per cent. in a cold store operating at 36° to 39° F., the stored product being pig carcase and cut joints, in tins or hung.

It was first necessary to establish the R.H. condition of the store on load, through operating conditions, *i.e.*, loading and unloading, with the refrigeration cycle on, and at off periods. Once this had been carried out, a means of measuring the amount of moisture taken from the product had to be found and agreed upon.

From the above, it was found necessary to establish at what R.H. a carcase would remain in balance, and not lose weight by evaporative cooling, and yet be cooled from approximately 70°F. to 36°/39° F.

The cold store used for this experiment had a normal direct expansion ammonia evaporator, with no special equipment ; the coils were of the usual design with no extended surface.

R.H. control to be maintained by a humidastat which had to be very effective at high R.H. conditions, 95 to 100 per cent.

It must be remembered that this store has no special equipment, and is in fact a type of store in common use, any alterations required had to cover a number of requirements, these being cost of extra equipment, no interference to production, no alteration to evaporators, no back pressure valves installed in suction line ; and yet a simple economic solution had to be found, a unit which would be transportable, take up virtually no space and yet be capable of producing the high R.H. required by the product.

During the experiments it became obvious that there is a need for a really efficient humidistat. A well-known make of thermo-hygrograph was used and readings checked against a normal wet and dry bulk thermometer. Weight measurements were also taken. The results were conflicting.

It would seem that the problem of converting a store already in use as a unit in a production line must be broken down step by step and the method used was :—

1. To measure the amount of moisture taken from the carcase.
2. Find an economical means and method of maintaining a high R.H.
3. Keep a clean evaporator surface to maintain efficient refrigeration and economical operating conditions.
4. Do not allow walls to sweat.
5. Do not allow slime to form on the carcase.
6. Do not allow the skin of the carcase to lose its "bloom."
7. Keep capital cost of equipment down.
8. Make no alteration to equipment already installed.
9. To carry out research into the follow up after the carcase leaves the store.
10. Consider the labour question of a man employed in a store held between 97 and 100 per cent. at 36° F.

ASHRAE IN SESSION

OVER three thousand members and guests assembled in Chicago from February 13 to 16 to attend the semiannual meeting of the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE). Headquarters for the meeting and for registration were the Conrad Hilton Hotel.

In attendance were Society members and guests from all parts of the United States and Canada, as well as from Europe and the Far East. Among the honoured guests was the president of the Institution of Heating and Ventilating Engineers, London.

Present at the welcome luncheon on February 13 were two senior past-presidents of ASHRAE's predecessor societies . . . Samuel R. Lewis, 1914 president of ASHVE, and Henry Torrance, president of ASRE, that same year.

New officers were installed at the banquet on Tuesday evening, February 14. R. H. Tull succeeded Walter A. Grant as president; John Everetts, Jr. became first vice-president. Speaker at the banquet was Joe Callaway, well-known lecturer and critic. Mr. Callaway's timely topic was " Lincoln Speaks To-day."

The 15th International Heating and Air-conditioning Exposition, sponsored by ASHRAE, was held at the International Amphitheatre; the exposition was open during afternoons and evenings from February 13 to 16 and displayed the latest products and equipment of more than 500 manufacturers in the fields of heating, refrigeration, ventilation, air-conditioning and allied industries.

THE INSTITUTE OF REFRIGERATION

61st ANNUAL BANQUET

Grosvenor House, London

In the chair :
Eng. Commander W. R. Sinclair, R.A.N., B. Eng.
Chief guest : Dr. Charles Hill, M.P.

International Institute of Refrigeration

Meetings of Technical Board and Commissions II, III, VIa, VIb, and VIII—Cambridge 1961

PROVISIONAL PROGRAMME

September 18, 19. Meeting of Technical Board in Downing College (restricted meeting).

September 20. *Morning*—Commission II, University Engineering Labs., "Insulation and insulating materials." Commission III, University Engineering Labs., "General engineering topics including those relevant to marine installations." Commission VIII, University Engineering Labs., "Ventilation of fruit cargoes." *Afternoon*—Commission II, University Engineering Labs., "Heat transfer and instruments." Commission III, University Engineering Labs., "Reciprocating compressors." Commission VIII, "Design of air ducts for refrigerated spaces on board ship." (Information about Commissions VIa and b will be circulated later.)

September 21. This day is kept free for visits to places of interest to the respective commissions.

September 22. *Morning*—Joint sessions of II, III and VIII. University Engineering Labs., "Possible future developments in refrigerating engineering as they will affect ships." *Afternoon*—Free for tour of university engineering laboratories. *Early Evening*—It is hoped to arrange a paper on a subject of general and topical interest.

We hope to send to all people who have given firm notice of attending, copies of relevant papers with translated summaries in good time before the meetings.

Accommodation. Accommodation has been arranged for the majority of those attending at Downing College. It is limited by the capacity of the college, about 120, and by the inability of the college to accommodate more than a very few women. Priority will therefore be given to men based on the date of their application forms and to those women attending the commission meetings in their own right.

It is necessary for those requiring hotel accommodation, either by reason of bringing their wives or by reason of preference, to let us have early notice of their requirements, if they should wish us to make reservations for them.

Members staying in college will pay the organizers for their accommodation on registering. The charge will be inclusive of all meals and will include gratuities. As it will be administratively impossible for us to prepare detailed bills for those attending, we are proposing to make inclusive charge for five different periods. In doing this we will take account of meals which we know, by reason of our programme, will not be taken in college, or at which the member will be a guest. We regret that we cannot however adjust for meals not taken in college for personal reasons. The periods provisionally proposed are:—

Evening, Saturday September 16 to Morning, Wednesday 20.

Evening, Saturday September 16 to Morning, Saturday 23.

Morning, Monday September 18 to Morning, Wednesday 20.

Morning, Monday September 18 to Morning, Saturday 23.

Evening, Tuesday September 19 to Morning, Saturday 23.

Final details will be sent to those giving notice of their intention of attending at about the end of June.

If readers are not attending the technical board meeting there is nevertheless no reason why you should not come earlier than the 19th should they wish. Subject to the limits mentioned earlier, accommodation in the college will be available.

It will be a considerable help to us in planning the programme for Thursday, September 21, if you would in the first instance reply to the secretary of the commission in which you are most interested, completing the attached form. If you do intend to come, the secretary of the commission would like to know by March 18, 1961.

K. C. HALES,
President, Commission VIII.
(Refrigerated Cargo Research Council,
Falcon Yard, Cambridge.)

MISS M. V. GRIFFITH, Secretary, Commission II (The Electrical Research Association Laboratory, Cleeve Road, Leatherhead, Surrey).

MR. G. L. H. BIRD, Secretary, Commission III (Durleigh Croft, Poplar Avenue, Norwood Green, Southall, Middx.).

MR. T. TELFER, Secretary, Commission VIII (Lloyd's Register of Shipping, 71, Fenchurch Street, London, E.C.3).

The Bulletin of the International Institute of Refrigeration, No. 6 1960

Reviewed by DR. EZER GRIFFITHS, *Hon. President of the I.I.F.*

THE working party studying "Transport of fruit cargoes" met in Hamburg. The main questions dealt with referred to bananas. A survey of the work will be submitted to the meeting of the technical board at Cambridge in September 1961.

The Japanese Association of Refrigeration celebrated its 35th anniversary in November 1960. Its various activities include a monthly review.

New research laboratories for food preservation will be opened in Australia in September 1961 followed by a Food Science Conference.

The *Bulletin* contains 166 abstracts grouped under appropriate headings; many refer to temperature measurements. Experiments over 15 years have shown that the platinum resistance thermometer is stable and can be used for calibration purposes down to 11°K. to reproduce the thermodynamic scale to an accuracy of 0.02°.

A compendium of the literature on thermodynamic properties of helium below 20°K. under pressures has been issued in the form of temperature-entropy and enthalpy-entropy charts.

A full abstract of a paper on soil science deals with heat transfer in a moist clay.

"The measurement of heat leakage in a cold store in operation" is an account of a technique for surveying the guarantee of insulation claimed by the contractors, and of checking the humidification of the insulating materials installed.

A brief abstract is given of a paper discussed at the Institute of Refrigeration Service Engineers on the advantages and dangers of employing a warning agent in odourless refrigerants. An interesting group of abstracts appear under the heading "Mechanical compression equipment." One on the determination of the maximum allowance piston-cylinder clearance; another on liquid ammonia recirculation systems, and a third on experimental characteristics of a centrifugal Freon compressor.

Among systems other than mechanical compression were contributions on absorption refrigerating machines with water-lithium bromide mixture and an analysis of the cycle of an absorption-diffusion refrigerator. Another abstract is entitled "Experimental investigation of a semiconductor water cooler."

The group under the heading of "distribution of cold," has one entitled "BWB a new refrigeration system with

fully automatic defrost." Insulation covers three abstracts: "The thermal conductivity of building materials in terms of moisture content," "the influence of capillarity on moisture migration in insulations composed of asphalt impregnated paper," "permeability and vapour barriers."

Prevention of frost-heave in refrigerated warehouses is dealt with under "Cold rooms" as well as weight losses in cold stored foods. The particular abstract relates to moisture exchange in cold storage rooms.

The removal of carbon dioxide from controlled atmosphere storages with water is in the same group.

Under large installations we note abstracts entitled: "Industrial methods of piping installation," "Construction of the latest cold stores for fish in Poland," "Rational pallet sizes for perishable foodstuffs."

A liquid nitrogen freezer adapted to production line submits the packages to liquid nitrogen at minus 320°F.

Air-conditioning installations are well covered. Among them a simple solution to completely automatic change-overs in air conditioning is the three-pipe system; High Velocity Air Conditioning—a bibliography. This summarizes 28 articles; "Odour control in air-conditioned spaces," "Mobile cooler conditions," "Africa's hot gold mines," and a lengthy abstract, "Air conditioning equipment for industrial rooms."

Refrigerated transport is fully covered. There are abstracts on measurement of cooling loads, two on rail transport, mechanical refrigeration for transport vehicles, details of the way in which the rating of the cooling load for refrigerated trailers has been standardized, and some problems associated with the use of a high-speed reciprocating compressor for aircraft cooling projects.

Two abstracts refer to the transport of liquefied gases.

There is a lengthy abstract entitled "The drying of gases by means of refrigeration." An account is given of a 4,000 ton plant for cooling the concrete in dam construction. Plant products are covered by many abstracts including: "The responses of immature peach embryos to low temperature treatments," from Warsaw "Advances in the chilling and freezing of fruit and vegetables," "The use of rooms with walls selectively pervious to gases for the industrial storage of fruit at average temperatures," "Volatile organic products of fruit during storage," "Experiments on cold storage of apple and pear varieties at three different temperatures," "Some preliminary observations on gas storage of bananas."

Under the heading "Meat," an abstract dealing with the determination of the refrigerating capacity of chilling rooms for pork meat, one entitled "Study of some factors occurring in the storage of fresh meat packaged in a transparent film," which discusses colour dehydration and microbial factors. Other abstracts in the same group are. "The storage of beef quarters in freezing rooms," "Diminishing of frozen meat shrinkage on prolonged storage," "Thawing processes for meat." "Freeze-drying of meat," "The application of antibiotics in the chill storage of poultry."

There is only one abstract dealing specifically with eggs. Its title is "Advances in the chilling and freezing of eggs and poultry."

A new process for the freezing of milk is described which involves a preliminary treatment with ultrasonic radiation.

There is an abstract of a 25-page paper from Warsaw dealing with advances in the cooling and freezing of fish and fish products.

Another paper from France records tests in the pre-storage of sardine by cooling in sea water at −1°C. A paper from Japan describes tests on the moisture distribution in frozen meat of swordfish during cold storage. Stored oysters is the subject matter of a paper from Canada.

Abstracts are collected over a wide field. There is one, for example, on the measurement of chill haze in beers, based on a report to the Convention of Brewing Chemists.

Under the heading "Canned food and cooked dishes," we find an abstract on the public health significance of micro-organisms in frozen pot pies.

There are many abstracts under the heading "The economic and statistical point of view." Some of the titles are: "The problems of refrigeration in horticultural economy facing the realities of the Common Market"; "French ice factories in 1958"; "Data on the refrigerating equipment of the People's Republic of China, Poland, Rumania and Czechoslovakia." One abstract relates to locker plants in Germany.

Information is given concerning a revision of the Swedish safety code edition 1950.

The Bulletin contains a paper read at the Polish Congress of Refrigeration entitled "The 'cold chain' in the production and distribution of foodstuffs and its role in Polish national economy." It extends to over 20 pages.

Various books have been received in the library of the Institute: a 451 page survey on the main trends of research in the exact and natural sciences, the dissemination of scientific knowledge and the application of such knowledge to peaceful ends. Published under the auspices of the United Nations, a book in German by Rietschel "Heating and ventilation technique," 14th edition, "Report of the specialists session on the organisation of the European market of frozen food," "Directory for the Refrigerating Industry" (German). "Refrigerating machines and apparatuses." (Russian.) Other Russian books deal with designs of machines, transport, turbo compressor machines, and electrical equipment.

The bulletin concludes with a table of contents for all the issues published in 1960.

Broken Delivery Promises

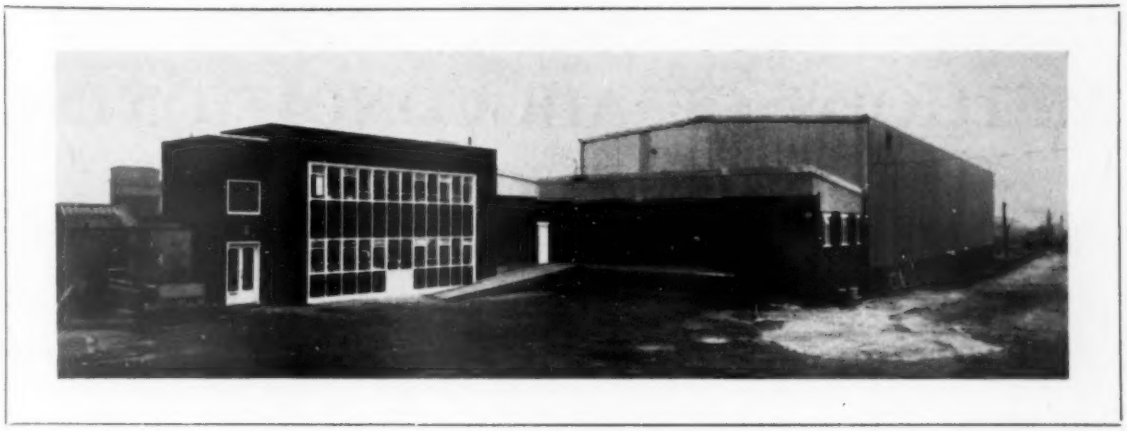
SIR WILLIAM McFADZEAN, President of the F.B.I., speaking about the export drive at a meeting of the F.B.I. midland regional council last month, made an appeal to chairmen and managing directors and, indeed, to everyone concerned throughout the country, to play their full part in ensuring adherence to delivery promises. He said:—

"There is one aspect of the export drive which is giving us serious concern. There has been a growing number of reports in recent months of broken delivery promises, i.e., failure to complete a contract on time or to supply goods ordered by an overseas customer by the promised delivery date. This is not, I know, a new problem, and admittedly we are not the only country falling down in this respect. One hears many similar complaints of broken delivery promises by other countries. But the failures of others can never be an excuse for ourselves. I prefer to regard them as opportunities of which we should take full advantage.

"There are of course many British companies which have an enviable reputation for getting jobs done and the goods delivered not only on time but often in advance of the promised date. This is as it should be, but the trouble is that those companies which fall down on the job do harm not only to themselves but also to all other British exporters. Unfortunately, a reputation for late deliveries spreads far more quickly and widely overseas than a reputation for contracts ably fulfilled to the letter.

"The damage to our export drive caused by late deliveries needs no elaboration. If the product in question is, for example, a piece of machinery for a new factory overseas, its failure to arrive in time will hold up the start of production. If the products are in the consumer goods fields and are wanted for, say, the Christmas shopping period and arrive too late, then their value to the overseas purchaser is largely lost. In almost every case, our failure to supply on time will have cost our customer money and he will not look favourably on purchasing British goods again.

"The causes of late deliveries are many and varied. Strikes and labour disputes, as we all know, can make punctual delivery impossible and do immense damage. Transport delays, or delays in handling at the docks, are yet another frequent cause of late deliveries. But the point I wish to stress is that although some of the causes are beyond our control, industry itself also carries a heavy responsibility.



New Cold Store in North London

THERE was keen interest in the opening of Green's Cold Store at 15, Tottenham Lane, London, N.8, last month. Situated alongside the Great Northern Railway main line it has a siding with an unloading bay leading directly into the store.

The store has an area of 143,000 c.ft. or a capacity of up to 1,500 tons, excluding the blast freezing unit. It was designed and built by Smith's Insulations Ltd., of Burton-on-Trent.

The refrigeration equipment, supplied by J. & E. Hall, consists of two 50 h.p. and one 35 h.p. compressors working on ammonia with pump circulation and designed for an operating temperature of –20° F. throughout. The store is cooled by four ceiling-mounted air coolers, water defrosted on an automatic time system. A blast freezing unit is available which is capable of blast freezing any types of goods in the ratio of 10 tons per 6-hours. The super freeze doors at each end are 10 ft. 6 in. high by 5 ft. 10 in. wide and are fitted with heaters and Miniveils.

For the insulation, Smith's used their unit construction technique of, in this case, 10 in. of expanded polystyrene on the walls and ceiling, and 10 in. of cork for the floor.

There is a loading bank at each end, each with a canopy over ; the one at the front end is for road vehicles and has a recessed weighing scale, whilst the one at the other end is against the railway line, and provision has been made for a scale to be installed later. Two offices, a men's changing room and toilets have been built on one side of the loading bay. The engine room with the main offices is built out from the other side.

Divided from the main part of the store by an insulated partition is a 6,000 c.ft. blast freezer, with a floor-mounted cooler and an access door, the same size as the main doors, on the front loading bay. The internal finish is in polar white cement, with a granolithic floor over the cork insulation.

Interior view from the front door towards the rear door of the new 143,000 c.ft. cold store built by Smiths Insulations Ltd., of Burton-on-Trent, for Green's Cold Stores at 15, Tottenham Lane, London, N.8, with a ceiling height of 30 ft. a large volume of mechandise can be stacked on the special stillages used throughout the store.

METHODS OF AIR-CONDITIONING MULTI-STOREY BUILDINGS

(*Continued from page* 164 *February issue.*)

By W. SENNHAUSER

IN the building, the ground floor plan of which is shown in fig. 3, part of the return air corresponding to the volume of fresh air is expelled to the atmosphere through a special exhaust-air system.

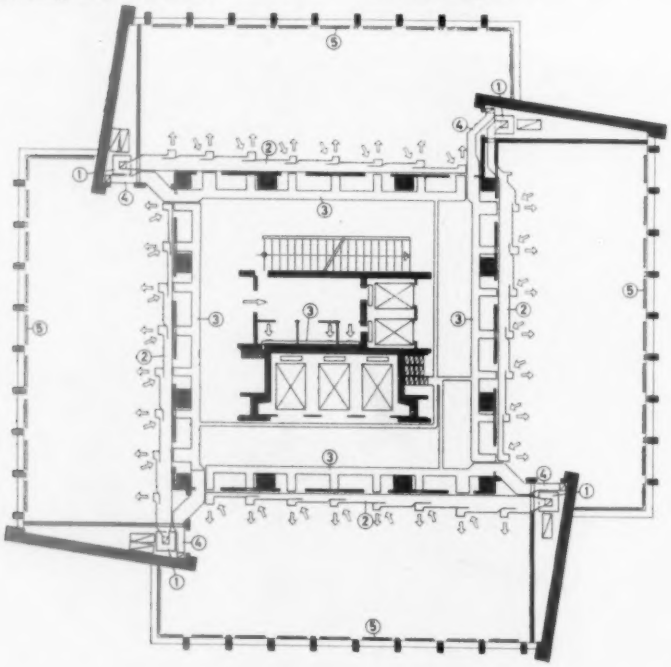
The supply air enters the rooms through perforated ceilings, a method which has given very satisfactory results, as it makes for even air distribution and permits very cool air to be introduced into the rooms in summer without causing draughts. This is particularly useful when sudden sunshine sends the cooling requirements up to a peak. In addition, the perforated ceiling facilitates the damping of noise in the room as well as that caused by the substations.

Radiators placed under the windows serve for base-load heating and can supply about 65 per cent. of the maximum heat requirements. The temperature of the water flowing through the radiators is adapted to weather conditions by a control unit fitted in the open air.

The total heat requirements of the building amount to 1,000,000 kcal per hour (just under 4,000,000 B.t.u. per hour). They are met by the works heating station through heat exchangers.

Fig. 3.—Ground plan, shown also in February, of the building depicted in fig. 1 with the four control zones.

1 **Floor substations**
2 **Supply-air distribution**
3 **Return-air ducts**
4 **Distribution of recirculated and exhaust air**
5 **Heating under windows**



The cooling requirements for an inside temperature of 27 °C. at 30 °C. outside temperature worked out at 115,000 kcal per hour. The "Freon" refrigerating unit installed is connected to a refrigeration accumulator or "ice bank." Should the cooling later be found insufficient, a second machine can be installed. In the central administrative building of an insurance company, in which the same air-conditioning system is employed, costs have been reduced by grouping five storeys in each zone on the east and west sides. The number of substations is therefore cut down, but the degree of individual control available in the vertical direction (where wind, sun and shadow may differ according to height) is still sufficient for practical purposes. The narrow front of the building looking south forms a separate control zone, and the same applies to the top floor, which is reserved for the management.

The supply air once more enters the rooms through perforated ceilings, while base-load heating is provided by sunk convectors under the windows.

The cooling requirements of 170,000 kcal per hour are met by two "Freon" compressors. As cooling water is in short supply, the heat from the condensers is given up to the air in an evaporative recooler.

The Air-Conditioning Convector System

When it became necessary to provide full air-conditioning and not merely heating for American sky-scrapers, great difficulty was encountered in finding room for the air ducts, and a system was therefore developed which made the return of air for recirculation unnecessary, so that only the 20 per cent. of fresh air required for hygienic reasons had to be distributed through the ducting (fig. 4).

The air-conditioning convector is usually placed under the window and consists of a system of ejector nozzles in which the primary air,

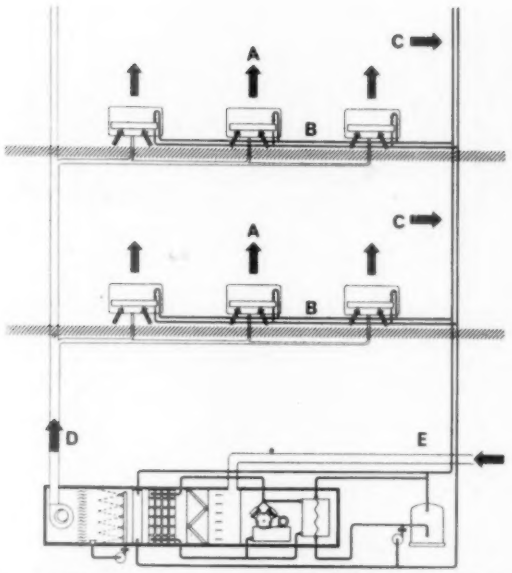


Fig. 4.—Diagram of a convector air-conditioning installation with central fresh-air treatment plant.

A	Supply air	100%	D	Primary air	20%
B	Recirculated air	80%	E	Fresh air	20%
C	Exhaust air	20%			

supplied at fairly high pressure, is expanded, with the result that it entrains about three to five times as much room air (see fig. 4.) The air is then heated or cooled while passing over the convector's exchanger surface and emerges at the top of the unit.

In winter the curtain of cold air descending at the windows can in this way be drawn in and warmed by mixing with the supply air, so that the window area is pleasantly air-conditioned. The situation is also favourable for cooling in summer, as the stream of cool air blown vertically upwards cools the blinds inside the window and reduces their heat radiation. This method of cooling, as already mentioned, is preferable for human comfort to an additional reduction of the air temperature in the room in order to compensate for radiation from the blinds. When the air-conditioning installation is shut down, the convectors can very well cover the heat losses of the building (for instance during the night or at weekends).

The conditions in every room can be regulated by controlling the flow of heating or cooling medium with the aid of the convector, and a maximum of adaptability to individual comfort requirements is thus obtained. The fully automatic regulators for air-conditioning convectors at present available on the market are rather expensive, and wide use is consequently made of the cheaper semi-automatic types.

Air-conditioning convectors are built either to stand freely in the room or to be fitted encased below the windows (fig. 5).

The Dual-Duct System

An intermediate position between conventional air-conditioning and the convector system is held by the high-pressure installation, in which cold and warm air are led in parallel through the building and every room or group of rooms receives the necessary amount of fresh air and the requisite heat or refrigeration through an automatically controlled mixing unit (fig. 6). In addition to its temperature control system, this mixing unit also incorporates a regulator for keeping the amount of mixed air constant. Figure 7 shows the basic diagram of a plant of this type, as installed in the multi-storey office building now under construction.

Part of the used air is returned to the air treatment station for recirculation and provides heat or cooling, as in the conventional system.

The total volume of air to be dis-

Fig. 5.—Encased air-conditioning convector in a manager's office.

tributed and in circulation is thus greater than with the convector system and amounts to about 75 per cent. that of the conventional system. For this reason the dual-duct system takes up rather more floor area of each storey for the vertical distribution of the air than the convector system, a point which is of some importance in multi-storey buildings. However, the ducts can be placed in the interior of the building, so that the narrow wall areas between the windows remain free. With the dual-duct system there is furthermore no difficulty in conditioning deep rooms or interior zones of the building just as evenly and effectively as the offices on the outside.

Here too a base-load heating system is provided under the windows, either a hot-water or an independent warm-air installation being used. With this latter method warmed (or cooled) air is blown vertically upwards, which offers the advantage over radiators that sufficient kinetic energy is always available, even in spring and autumn, to counteract the downward flow of cold air at the windows, whereas with radiators or convectors this energy depends on temperature and thus may not always be sufficient. The air thus expelled can also be used for cooling the windows in summer.

Fig. 6.—Sulzer mixing unit for the dual-duct system with automatic temperature and rate-of-flow control.

The mixed air is introduced into the rooms through perforated ceilings, anemostats or window units. Installation costs can be reduced considerably if several similarly located rooms can be connected to a common mixing unit.

The first question which arises in the treatment of any air-conditioning project is that of the most suitable system. In the multi-storey buildings which we are considering here, the conventional low-pressure system is hardly used today, as the air ducts take up too much floor area in the various storeys.

The dual-duct system may be at a disadvantage for the same reason, as compared with the air-conditioning convector system, when the building concerned is very tall and the ground area comparatively small, and when it is not possible to provide special floors for technical equipment.

One air-conditioning convector is placed below each window. This leaves the full room space free, while a few standard types of convector are sufficient to meet all capacity requirements. With the dual-duct system it is an advantage to place the mixing chambers in false ceilings in the corridors, where they do not take up valuable floor space. The air ducts, however, are bulkier than those required for convectors. With the dual-duct system, numbers of window modules, if the rooms are used for similar purposes, can be connected to the same mixing chamber. This of course reduces the price of the installation, a consideration which sometimes decides the issue.

The two systems are roughly equal in respect of noise, provided care is taken with the installations ; the general noise level of the surroundings will of course also affect the situation. Often it will be necessary to compromise between desired air flow for a given space and admissible noise at the given noise level of the surroundings

The cooling of the condensers of the refrigerating plant is frequently a problem, as the municipal water supply may be unable to provide water, or at any rate sufficient water, for this purpose. Recourse can then be had to evaporative coolers in which the condenser heat is given up to the air and only 5 to 10 per cent. of the normal cooling-water flow is required. Some waterworks stipulate that the water they supply for cooling purposes must be heated by a minimum of, say, 12 °C.

Where so many factors have to be

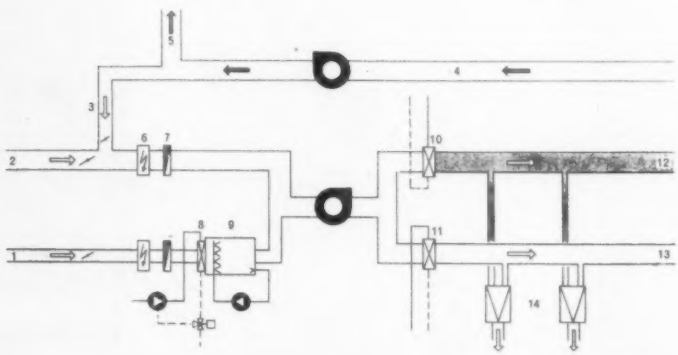


Fig. 7.—Diagram of a dual-duct system.

1	Minimum air supply	8	Preheater
2	Additional air supply	9	Humidifier
3	Recirculated air	10	Air cooler
4	Used air	11	Air heater
5	Exhaust air	12	Cold-air duct
6	Electrostatic precipitator	13	Hot-air duct
7	Mechanical filter	14	Mixing units.

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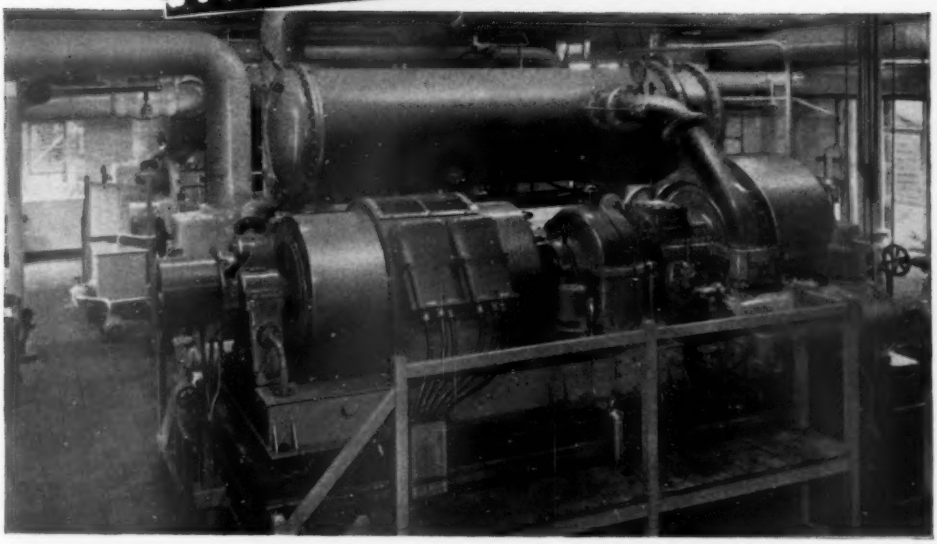

The illustration shows one of the three CENTRIFUGAL REFRIGERATING MACHINES supplied and installed by J. & E. Hall for the Harrow (Middlesex) Works of Kodak Ltd. They are used for controlling temperature and humidity during the processing of their products. With a total b.h.p. of 2150, the machines have an output of 16,200,000 B.t.u./h—equivalent to 1,350 tons of refrigeration!

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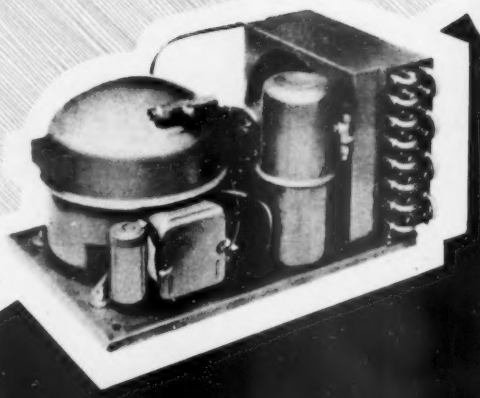

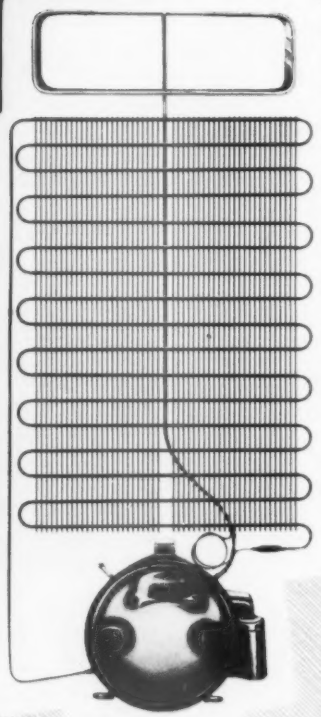

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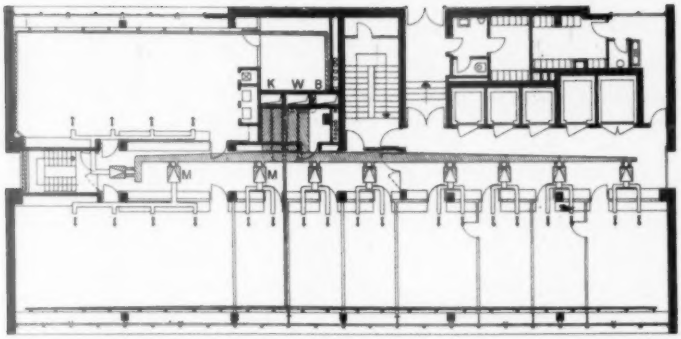

Fig. 8.—Typical floor plan of a multi-storey office building with a dual-duct air conditioning installation.

B Window-air duct
K Cold-air duct
W Warm-air duct
M Mixing units

considered, it is impossible to lay down any general rules as to the best or most economical method of air-conditioning. Every concrete case calls for careful study by qualified engineers, who must take both technical and financial factors into consideration in selecting the system best suited to the given requirements.

"UNIVERSITY" RANGE OF SELF-CONTAINED, AIR-CONDITIONING UNITS

AIR Process Units Ltd. have developed their "University" range of air-conditioners expressly to meet the constantly increasing demands for specialised air-conditioning. Comprising nine different models, all of which can be either air or water cooled, the "University" not only provides a continuous supply of clean filtered air, but their controls can also be pre-set to obtain close limit control of humidification and temperature for the most varied requirements.

The design, white grilles set in a casing of parisian grey, ensures that the instrument is unobtrusive as does the extremely adaptable manner in which installation may be effected. The units may be housed either at floor level or at virtually any room height and are equally effective when installed against a wall or in the centre of a room (*e.g.* against a bench or counter). The versatility of installation has been planned with an eye to the fact that whilst many buildings today are designed to incorporate air-conditioning, there is also a rapidly expanding need for this service in older premises.

* * *

Merchandising Vision, a journal devoted to packaging and merchandising methods and trends, which has appeared quarterly since 1955, is now to be published every month in a larger format. It is published by British Cellophane Ltd., manufacturers of transparent films for packaging and other uses and exporters of films, and is believed to be the first trade monthly of its kind to be put out by a U.K. packaging concern. It is sent free of charge to B.C.L. customers and any other organizations interested in packaging throughout the world.

* * *

British Maker at Cologne Fair.—From Teddington Refrigeration Controls comes the news that they occupied a stand at the Spring Fair for Domestic Appliances held in Cologne from February 24 to 26.

* * *

Borough Polytechnic.—The governors of the Borough Polytechnic, London, have appointed Mr. J. F. Douglas, M.SC.(ENG.), A.C.G.I., D.I.C., A.M.I.C.E., A.M.I.STRUCT.E., as head of the department of mechanical engineering in succession to Mr. G. L. H. Bird.

* * *

BOOK REVIEW

"The Packaging of Food and Beverages" By FREDERICK T. DAY. Published by *Trade Journals Ltd.* £2 10s.

Recent years have seen a revolution in packaging. Apart from the normal hygiene requirements, food and beverage packages must now be informative and have "eye-appeal," especially since the rise of self-service stores and supermarkets. Mr. Frederick T. Day, who has spent his entire working life in one of England's largest packing houses, has produced a much-needed authoritative book on the packaging of food and beverages. This well-illustrated and informative account covers all the processes involved in packaging—selection of materials, methods and machinery for filling, sealing, labelling, and the display of food products.

NEW COMPANIES

The accompanying particulars of New Companies recently registered are taken from the Daily Register compiled by Messrs. Jordan and Sons Ltd.

Wrexham Refrigeration Ltd., St. Johns Chambers, Love Street, Chester. Secretary: W. Morgan. Capital: £6,000. Directors: Frederick H. Sullivan, Seven Gables, Linksway, Upton, near Chester; Harold G. Jenkins, Elmfield, Plough Lane, Christleton, Chester; Thomas H. Jones, 32, Belle Vue Road, Wrexham.

Elgee (Refrigerators) Ltd. Capital: £100. Subscribers: F. Petheram and E. Morris (clerks), 18, Austin Friars, E.C.2. Registered by Solicitors, Slaughter & May, E.C.2.

Nottingham Refrigeration Ltd. Trent Street, Nottingham. Secretary: W. M. Stevenson. Capital: £4,000. Directors: Dennis A. Pascoe, "Ingledell," Mapperley Rise, Nottingham; William M. Stevenson, 37, Burnside Drive, Bramcote Hills, Nottingham.

Stafford Refrigeration Ltd. 44, Tithe Barn Road, Stafford. Capital: £2,000. Directors: Percy T. Birks and Jean D. Birks, 44, Tithe Barn Road, Stafford.

Stevens & Smith (Refrigeration) Ltd., 178, High Street, Epping, Essex. Secretary: A. C. Major. Capital: £10,000. Directors: Francis C. Stevens, 1, Blythwood Gardens, Stansted, Essex; Peter F. Smith, Little Brookfield, Paslow Common, Blackmore; Alexander C. Major, 11, Basset Gardens, North Weald, Essex.

Ice Rink Insulation

FOR the first time Onazote has been used in the construction of an ice rink—at the new rink in Altrincham (Cheshire). Onazote was used for all the insulation at the rink, which is the first to be built in Britain since the 1939-45 war.

Apart from the floor which measures 85 ft. by 190 ft., Onazote was used for insulation in the engine room. The floor was laid by the main contractors J. H. Smith (Hale) Ltd., and the insulation in the engine room was carried out by Cork Insulation and Asbestos Ltd. Insulation work for the header trench and auxiliary piping was done by Onazote Insulation Co. Ltd.

New Tonnage for Australasian Route

ANOTHER refrigerated cargo liner for the Shaw Savill Line was launched last month at the Linthouse, Glasgow yard of Alexander Stephen & Sons, Limited. She was named *Iberic* and the launching ceremony was performed by Mrs. Stilwell, wife of Mr. D. J. Stilwell who is the Shaw Savill Line's manager for Australia.

Iberic, the 24th vessel built for the line since World War II, is the first Shaw Savill ship to bear this name. The Shaw Savill Line has an impressive record of new building since 1945, *Iberic* bringing the total to well over a quarter of a million tons.

This is not the first time that the firm of Alexander Stephen & Sons, Limited has built for the Shaw Savill Line, as the *Matakana*, which was lost during World War II, was built at this yard in 1921.

Iberic will be a single screw motor vessel of approximately 11,250 gross tons and her general design will be similar to the single screw motor vessels *Ionic* and *Illyric* already in service, and the *Icenic*, expected to commence her maiden voyage quite soon.

Iberic will have a service speed of 17 knots and in her six cargo holds, four of which will be insulated, she will have capacities for about 410,000 c.ft. for refrigerated and chilled cargo and about 240,000 c.ft. for general cargo. This general cargo space includes four edible oil tanks in No. 6 hold, designed for the carriage of bulk tallow amounting to a total of 275 tons. With an increasing difficulty in obtaining drums and casks at an economic price, it is considered that in the future tallow will be shipped to an increasing extent in liquid or bulk form. These tanks can be used alternatively for general cargo ; and also for other liquid cargoes.

In addition to *Iberic*, two other cargo vessels *Icenic* and *Amalric* are nearing completion, and the keel was laid in April last for the *Northern Star*, a passenger liner of some 22,000 gross tons, due to join the *Southern Cross* in the round-the-world service in July, 1962. *Iberic* will be under the command of Captain John W. Hart, commodore of the Shaw Savill Line.

NEW NICOL PREMISES

Craig-Nicol Ltd., of Glasgow, have developed additional premises at Portman Street, Glasgow, to meet the pressure on their Pollokshaw Road premises and are now carrying out production of counters and cold rooms at Portman Street supplementing the cabinets and frozen food unit production at the older premises.

A presentation of newer designs was staged at Portman Street early in March to show the trend of design and production to trade visitors.

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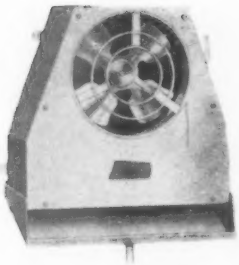

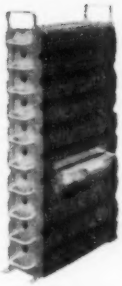

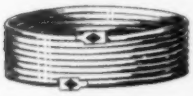

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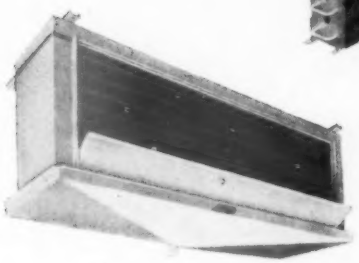

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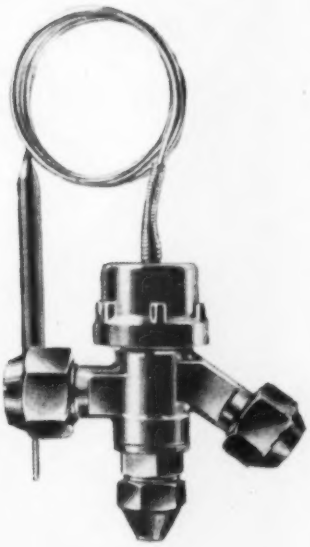

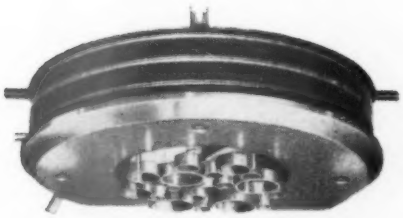

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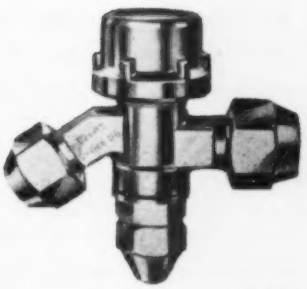

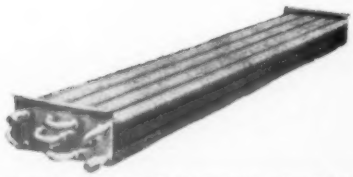

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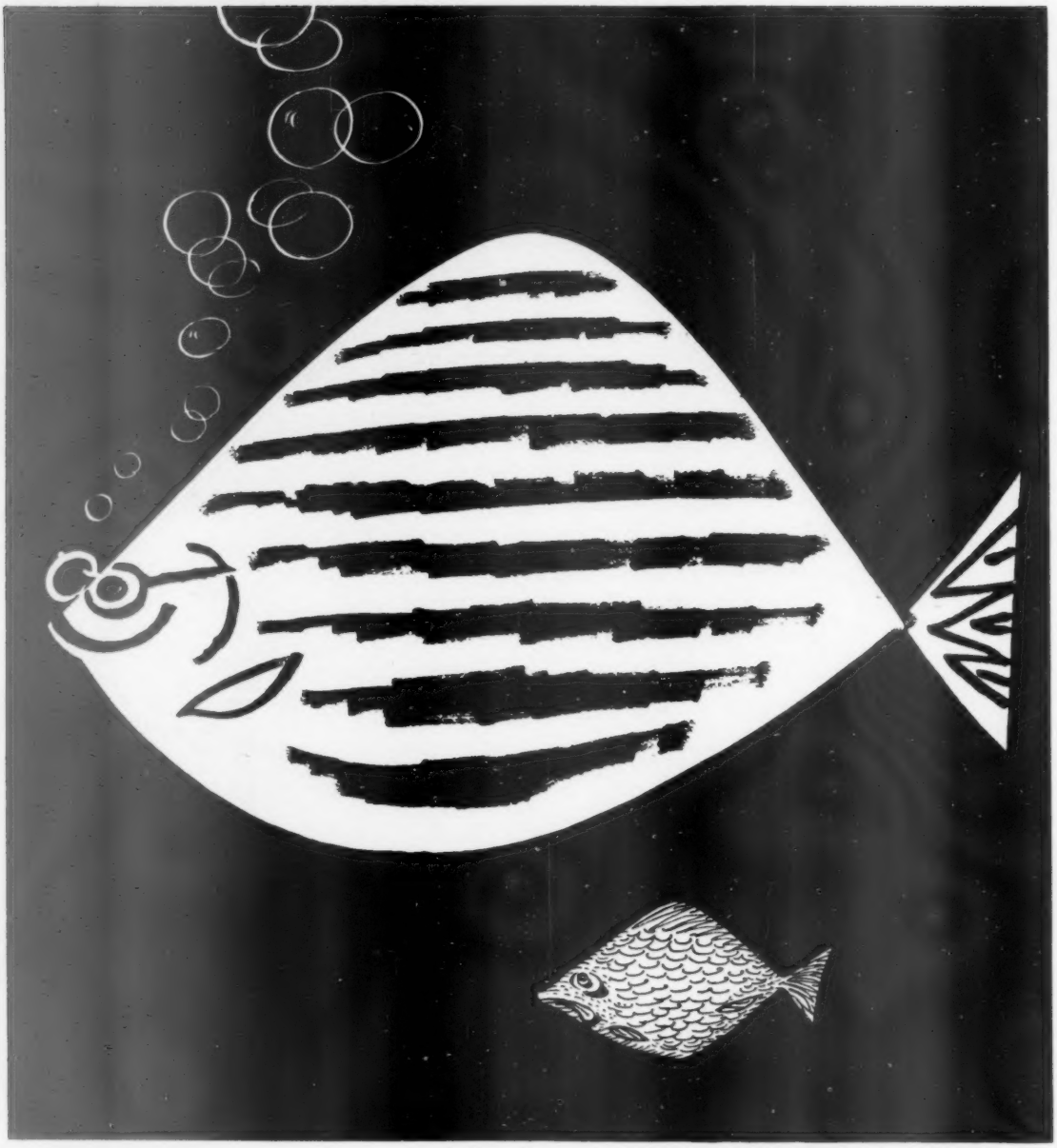

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Refrigeration experts from Prestcold visit Gloucester to discuss storage problems with local fruit farmers. Picture shows from left to right: Mr. J. G. T. Michel, sales engineer, Prestcold; Mr. A. D. Palmer, sales engineer, Prestcold; Mr. F. S. Rimington, chairman at the meeting and one of the largest fruit growers in the county and Mr. W. H. Dempsey, farm buildings advisory officer for the south-west region of the Ministry of Agriculture and Fisheries.

Planning for a Fruit Glut

FRUIT FARMERS from Gloucester, Hereford and surrounding counties recently visited Agriculture House, Gloucester—local headquarters of the National Farmers' Union—to hear refrigeration experts from Prestcold explaining details of design and construction of their refrigerated fruit stores.

The meeting was planned by Mr. R. C. Twyman, the county horticultural and advisory officer, following a recent visit he made to a number of Prestcold sectionalized cold stores in Kent.

"Many west country fruit farmers are interested in these refrigerated stores," he said. "This is because 1960 saw one of the heaviest crops of apples and pears ever recorded in this country. Such abundance is to be expected in the future as more and more of the post-war plantings come into cropping."

Mr. Twyman pointed out that increased yields could have the result of reduction of prices and storage problems if growers failed to realize the importance of controlling the marketing and storage of their fruit. He added that erection of refrigerated stores was the solution to the problem and that the conference was arranged to assist in this development.

Mr. W. H. Dempsey, farm buildings advisory officer for the south west region of the Ministry of Agriculture and Fisheries, attended the meeting and described standards expected by the Ministry with regard to improvement grants for approved stores. This applies to the cost of the building, construction, planning and includes refrigeration plant.

In developing a satisfactory refrigerated fruit store, Prestcold have had to overcome numerous problems. Mr. A. D. Palmer, a sales engineer from Prestcold's Kent branch, showed many of these difficulties had been defeated while Mr. J. G. T. Michel—who travelled to Gloucester from Prestcold's giant new factory at Swansea, South Wales—explained the nature and details of refrigeration machinery. The talks were illustrated with projected photographs and drawings.

The conference was organized by the Ministry of Agriculture, Fisheries and Food Advisory Services: National Agricultural Advisory Service, Agricultural Land Service and Gloucestershire Fruit Growers' Club.

Finned Tubes in a Cross-Flow of Gas*

By A. LYMER, B.SC.(ENG.), A.M.I.MECH.E.†
AND
B. F. RIDAL, B.SC.TECH.‡

SINCE 1957 some improvements have been made in what has now become the routine measurement of heat transfer performance from a bank of finned tubes and they are described below together with a brief outline of the method and apparatus.

The heat transfer rate between a gas and unit length of finned tube may be expressed as

$$q = \int_o^s h \, \Delta\theta \, \mathrm{d}S$$

where $\Delta\theta$ is the local temperature difference between the gas and the finned surface. For a uniform h

$$q = h \int_o^s \Delta\theta \, \mathrm{d}S$$

$$= h \, \Delta\theta_{\text{mean}} \, S$$

$$= h \, \phi \, (\theta_s - \theta_g) \, S$$

*Extracts from paper in a symposium on "The Use of Secondary Surfaces for Heat Transfer With Clean Gases," arranged by The Institution of Mechanical Engineers under the aegis of The British Nuclear Energy Conference.

†Engineering manager, Flexibox Ltd., Manchester (formerly senior development engineer, Nuclear Power Development Team, Simon-Carves Ltd).

‡Development engineer, Nuclear Power Development Team, Simon-Carves Ltd.

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where $\Delta\theta_{mean}$ is the mean difference between the average gas temperature and the finned surface temperature. The heat transfer rate q is determined experimentally for different mass flows of gas, using air in this case. Estimated values of $\theta_s - \theta_g$ are used which enable values of $h\phi S$ to be calculated over a range of air mass flow.

The heat transfer characteristics are normally determined for a finned tube placed centrally in the seventh row of a bank of staggered tubes, eight rows deep in an open-circuit wind tunnel, nominally 20 in. square. Atmospheric air is drawn over the tubes, whilst the tube under test is heated with slightly superheated steam at just above atmospheric pressure. The amount of condensate is a measure of the heat transferred.

Heat Transfer Rates

In calculating the heat transfer rate, allowances are made for superheat of the steam, under-cooling of the condensate and radiation and end losses. The outside tube surface temperature, θ_s, is calculated by deducting from the saturated steam temperature allowances for the temperature drops over the condensate film and the tube wall. The temperature drop over the condensate film was determined experimentally for a tube 20 in. long :

$$\Delta\theta_f = \left(\frac{q}{2200\ S_i\ L}\right)^{\frac{5}{4}}$$

which agrees very closely with McAdams (2) equation:

$$\Delta\theta_f = \left(\frac{q}{4000\ S_i\ L^3}\right)^{\frac{3}{2}}$$

During condensation some magnetite is deposited on the inner wall of the tube but its effect on $\Delta\theta_f$ is found to be almost negligible if before each day's experiments the bore is cleaned with dilute hydrochloric acid, scrubbed and flushed with water. This procedure also ensures film-wise condensation of the steam. The temperature drop over the tube wall is calculated assuming a uniform heat flux. The average air temperature θ_g is the arithmetic mean of the air temperature before and behind the tube.

There is a row to row variation in $h\phi$ which is measured by condensing steam in the centre tube of each row in turn. For a staggered bank of annular or spirally wound finned tubes, $h\phi$ increases to a constant value by about the fourth row and remains constant except at the last row where it is again lower. This variation may be allowed for by using a factor to express the mean coefficient for n rows as a ratio to that at the seventh row. By combining this factor with the conductance for the seventh row, a mean value of conductance is obtained for a bank n rows deep.

Gardner (3) shows that by making various assumptions, the principal one being that of uniform h, ϕ can be calculated for various fin shapes. From the curve of h against $h\phi$, a value of h is obtained for a particular value of $h\phi$ and this may be expressed non-dimensionally by a Nusselt equation :

$$\frac{hd}{k_g} = a\left(\frac{Gd}{\mu}\right)^a\left(\frac{c_p\ \mu}{k_g}\right)^{\frac{1}{3}}$$

where a and a are constants. G is the air mass flow based on the face area of the bank and air film properties are evaluated at the mean film temperature,

$$\theta_g + \left(\frac{\theta_s - \theta_g}{2}\right)\phi.$$

The heat transfer between this particular finned tube and a gas other than air, for example, carbon dioxide whose properties are denoted by a dash, is obtained at the same Re: using

$$h' = h\left(\frac{k'_g}{k_g}\right)\left(\frac{P'r}{Pr}\right)^{\frac{1}{3}}.$$

For this value of h' there is a unique value of ϕ' and, therefore, of $h'\phi'$, the conductance in carbon dioxide.

It is estimated that the experimental error, arising mainly from errors in the temperature drops over the condensate film and tube wall, is about $\pm$ 2 per cent. In transposing experimental data to design conditions using pressurized carbon dioxide the principal errors arise from evaluation of fin efficiency and the thermal conductivity of air and carbon dioxide. The probable error on design data is reckoned to be $\pm$ 6 per cent.

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Continued on page 292

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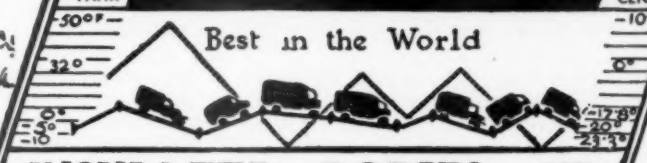

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Right: Parnall's new "Superkool" cabinet.
Left: Parnall's "Kooljak."

Their other new product, the "Superkool" is a display counter of conventional design but the front panel under the glazing is plastic on metal laminate and is available in a range of colours.

PLANNING OF MECHANICAL SERVICES FOR HOSPITALS*

By Kenneth Stead† and B. T. Rose.†

Services in General

WHEN planning mechanical services for hospitals, the engineer should remember Florence Nightingale's maxim "The very requirement of a hospital is that it should do the sick no harm," and relating this to the mechanical services we should like to suggest:

(a) The first requirement of any mechanical service is that it should not be a potential danger to the patient.
(b) The second requirement of any mechanical service is that it should not be an inconvenience to the staff.

Taking the first requirement it is unlikely that any mechanical service can be a direct danger, but it is possible that indirect harm can be caused either by the breakdown of equipment or by its use increasing the chance of cross infection.

Some services, such as the ventilation of an operating theatre, are vital and their failure cannot be envisaged.

Cross infection is a problem peculiar to hospitals, and it can be defined as an infection not due to the patients' condition at the time of entry. Cross infection can be caused either by contact, which is mainly counteracted by efficient sterilizing procedure and nursing discipline, or by air-borne germs. The engineer is directly concerned in the latter, positively in aseptic areas, where a supply of fresh filtered air is required to reduce the concentration of infected particles and also by maintaining a positive plenum within the space preventing the entry of contaminated air. Negatively, in other spaces such as wards, etc., by providing equipment which is not dust forming or which does not, by unsuitable air flow, spread infected particles over a greater area than they would normally reach.

Operating Theatres

The requirements of a heating and ventilating system serving an operating theatre are:

(a) To facilitate the maintenance of aseptic conditions by ensuring that only clean air enters the theatre and contaminated air is quickly and safely removed.
(b) To maintain the humidity within the theatre above 55 per cent. RH. to reduce the possibility of electro-static build-up causing a discharge and igniting inflammable gases.
(c) To dilute any inflammable gases, which may escape in the theatre, below the possible flash point.
(d) To provide comfortable working conditions within the theatre.

To meet the above conditions it is necessary to provide a mechanical ventilation system.

The air within a theatre must be changed to remove the infective particles and also any inflammable gases, but as the air change to dilute the gases below a safe level, is well below the necessary to maintain a low bacteria count, the latter is the only joint usually considered.

The air change necessary to maintain a suitable low bacteria count is not definite and figures of from 10 to 20 changes per hour and no air recirculated are quoted.

* Excerpts from a paper to be presented to the Institution of Heating and Ventilating Engineers on February 9th, 1961. Manuscript received, December 12th, 1960.

† Messrs. J. Roger Preston & Partners.

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Although air-conditioning is desirable in tropical hospitals, it is usually impossible from a cost angle to air-condition the whole of the hospital. Most areas, are therefore designed to give good natural cross ventilation and air-conditioning is limited to spaces where it s absolutely essential such as operating theatres, blacked out X-ray rooms, etc. So far as possible, the air-conditioned sections should be grouped together and that part of the building designed in an economic manner for air-conditioning. i.e. a large cube to surface area ratio and small windows, as distinct from naturally ventilated buildings which should be long and narrow with large openable windows.

Where it is necessary to air-condition the complete hospital, care should be taken to avoid mixing of recirculated air as this may increase the chances of cross infection and probably the best arrangement is a primary fresh air supply with local room units recirculating the air in that room only.

Operating Theatres

The theatre must be sealed from outside and a filtered air supply is required. This means that the inside temperature and humidity are worse than outside and air-conditioning is essential to provide acceptable working temperatures.

A.R.I. DEVELOPING TRAINING PROGRAMME FOR SERVICE AND INSTALLATION PERSONNEL

WITH a " pilot " operation already in effect, the training committee of A.R.I.s unitary air-conditioner section hopes to expand its training programme into a dozen or more public school systems by the beginning of the 1961-2 school year. The ultimate goal is to produce a " package " training course in air-conditioning and refrigeration service and maintenance usable in high schools and vocational schools throughout the country where a neeed exists for the training of installation and service mechanics.

This was the gist of a report made to the unitary section at its meeting in Hollywood Beach by A. E. Meling, chairman of the training committee named last spring to develop programmes aimed at increasing the supply of qualified service and installation personnel.

The committee recommended, and the section approved, subject to action of the A.R.I. executive committee, addition to the A.R.I. staff of a full-time man to handle the training programme as soon as it has been developed to the point of offering it to schools throughout the country. All other recommendations and proposals of the training committee were also approved.

Mr. Meling, director of service, Carrier Air-Conditioning Company, reported that the pilot operation already operating is in Central High School, Syracuse, where " we now have two sample classes running at night and one during the day." In addition to high school students attending the day class, 56 men from the offices and shops of mechanical contractors, consulting engineers, dealers, distributors and manufacturers in the Syracuse area are attending the two night classes. Commenting on this, Mr. Meling said :

" Both day and night courses are important. The night course permits the training of personnel in one school year. The day courses are slower, usually starting in the second year of high school and requiring three years to turn out trained personnel."

A second pilot operation may be started in a Columbus, Ohio, high school with the beginning of the second semester, spearheaded by Harry C. Gurney, and Coit B. Lytton. Mr. Gurney, a member of the training committee is general sales manager of Janitrol Heating and Air-Conditioning Division, Midland-Ross Corporation, and President of the National Warm Air Heating and Air Conditioning Association. Mr. Lytton is sales manager for Lennox Industries Incorporated, and former chairman of the unitary section. By the end of the school year, it was reported " we hope to be in a position to spell out all the details of what has to be known, curriculum, material, lab specifications, equipment, etc., to carry on this kind of teaching in a public high school."

The " package " which is being developed as a result of these and subsequent prototype classes probably will include curriculum material for both day and extension course students, together with a set of instructions as to how distributors representing the A.R.I. member-manufacturers would go about introducing similar courses in local high schools, Mr. Meling said.

Promotional Work

In addition to the development of textbooks, curriculum, and other preliminaries, Mr. Meling pointed out that a part of the job, after the programme is developed, will include promotional work with guidance counsellors to encourage them to advise more students to go to technical high schools to study refrigeration and air-conditioning : encouragement of distributors and service organizations in various cities to co-operate in working with school officials to get the programme established, and the employment of qualified instructors, which usually will be paid by the school system.

" You can't get the high schools to consider a programme unless it's on an industry basis," he advised. " If there are a number of distributors participating, the cost to any one of them for operating equipment and other essentials is nominal."

It was pointed out, further, that, in order to establish a course, " you have to provide some equipment—a lot of this can be what amounts to discontinued equipment—equipment that students can take apart and put back together again to find out how it's made, but you have to supply enough new equipment to get an operating plant."

Emphasizing the need for the A.R.I. training programme, chairman Meling reiterated his statement made at the time the committee was appointed : " If we could get the men to install and service our equipment, we could double our volume. We need a training programme." To this he added : " Unless twice as many people are trained during the next decade as are available now, the expansion of this industry will be seriously hampered."

In addition to Mr. Meling and Mr. Gurney, members of the committee include George E. Mills, A.R.I. director of public relations, and Frederick J. Reed, A.R.I. chief engineer.

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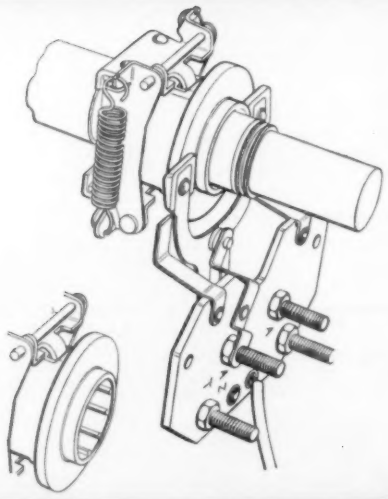
This thing called know-how



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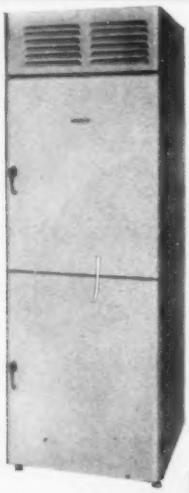

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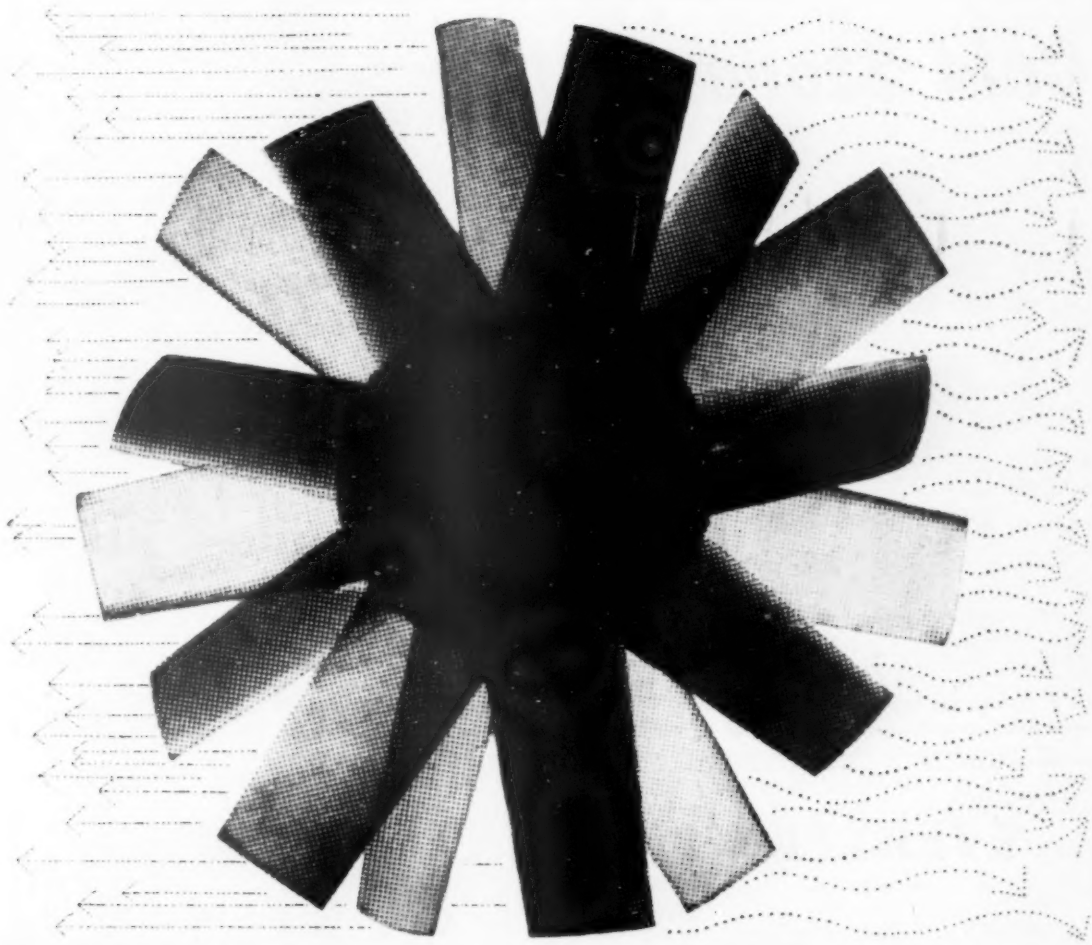

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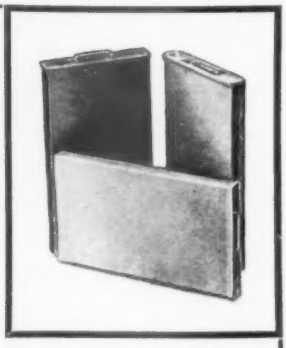

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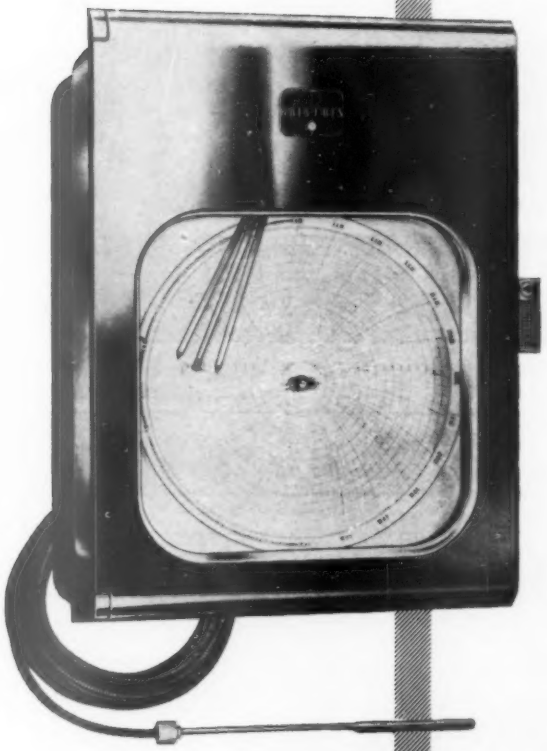

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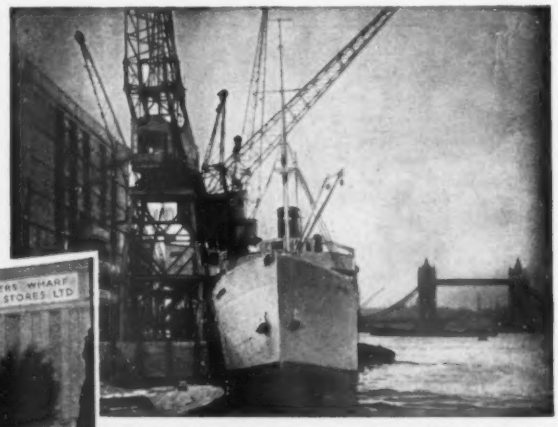

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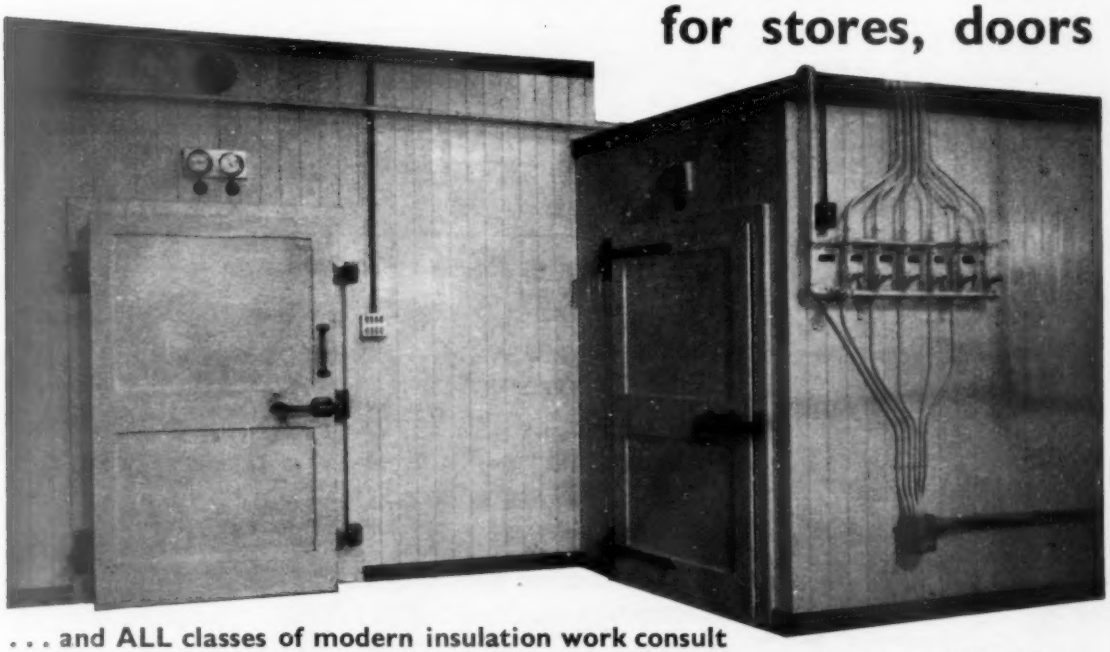

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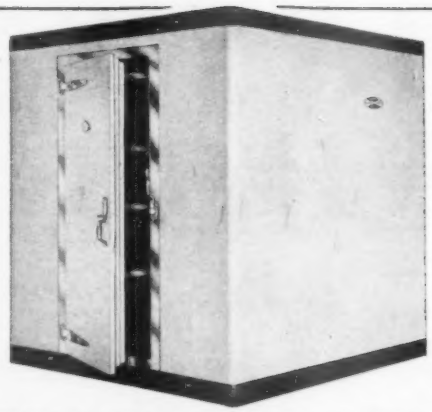

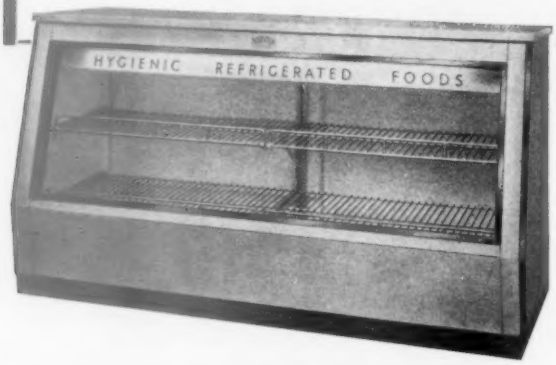

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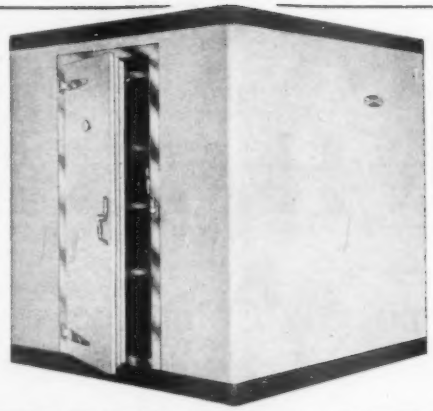

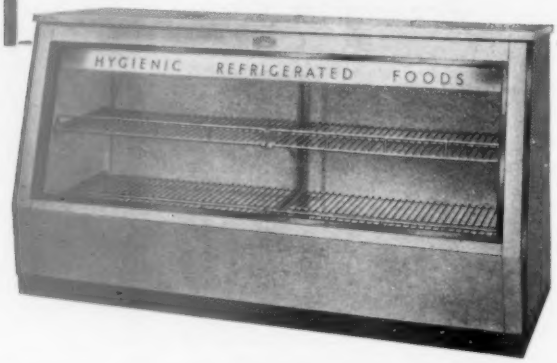

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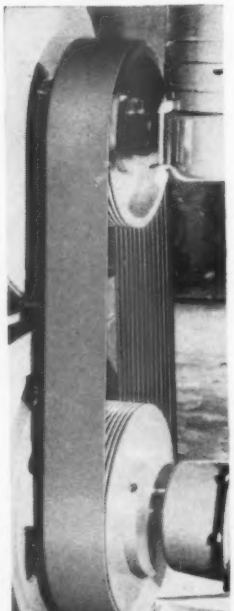

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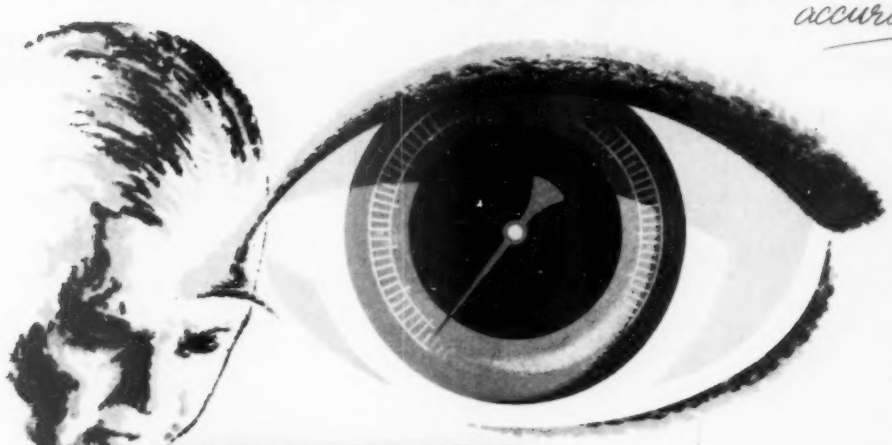

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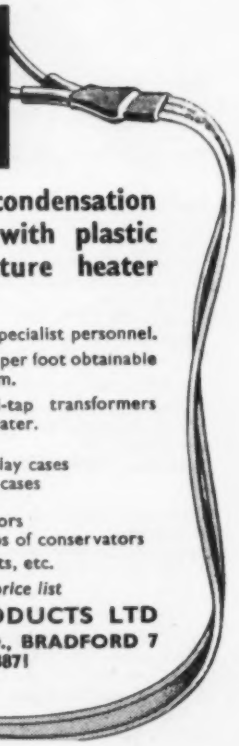

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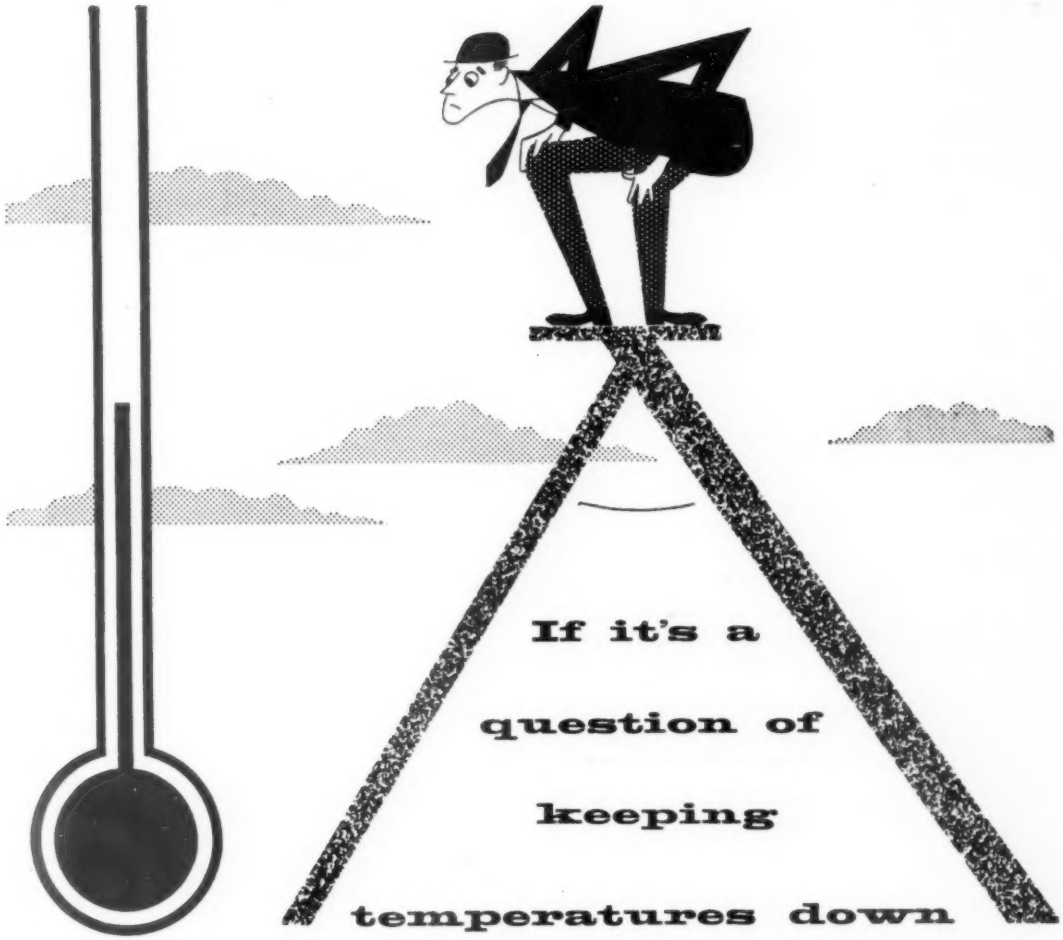
INDEX TO ADVERTISERS

	PAGE
Aero Pipe & Glass Co.	296
Alpine Insulations Ltd.	306
" ASHRAE Journal "	306
Aubanel & Alabaster Ltd.	February
Badische Anilin & Soda-Fabrik A.G.	January
Baxenden Chemical Co. Ltd. ...	244
Bennett (R. A.) & Co.	307
Blox Services Ltd. ...	February
British Bitumen Emulsions Ltd.	February
British Railways	December
British Rototherm Co. Ltd. ...	305
Broadbent (Thomas) & Sons Ltd.	February
B.T.R. Industries Ltd. ...	238
Bucknall (Henry) & Sons Ltd.	February
Burnham (John) Ltd.	226
BX Plastics Ltd.	February
Cassey (Walter) Ltd.	207
Chambers Wharf & Cold Stores Ltd.	300
Chrysler International S.A.	220 & 221
CLASSIFIED ADVERTISEMENTS	241, 242 & 243
Cole (E.K.) Ltd. ...	January
Commerce Factors (G.B.) Ltd.	306
Commercial Plastics (Sales) Ltd.	December
Consolidated Zinc Corporation Ltd.	236
Cork Growers Trading Co. (1931) Ltd.	January
Cork Insulation & Asbestos Co. Ltd.	February
Crompton Parkinson Ltd. ...	295
Danfoss Manufacturing Co.	Cover iv
Dean & Wood (London) Ltd. ...	235
Dewhurst & Partner Ltd.	February
Dex Industries Ltd. ...	January
Distillers (The) Co. Ltd. ...	213
Distrene Ltd.	January
Douglas (Wm.) & Sons Ltd. ...	218
Dunham-Bush Ltd.	219
Dutton (Leonard) & Sons ...	291
Eastwood Mill Co. Ltd.	February
Elliott Bros. (London) Ltd. ...	299
Evomastics Ltd.	232
Expanded Rubber Co. Ltd.	February
Flamingo Foam Ltd. ...	December
Frigidaire	288
Frozt-ed-Aer Refrigerators ...	302
Fylde Ice & Cold Storage Co. Ltd.	291
Gill (H.) Stampings Ltd.	February
Girdlestone Pumps Ltd.	February
Goodlass, Wall & Co. Ltd. ...	225
Great Grimsby Coal, Salt & Tanning Co. Ltd.	298
G.V.E. Ltd.	303
Hall (J. & E.) Ltd.	281
Hawker Siddeley (Hamble) Ltd.	February
Hay's Wharf Ltd.	301
Heath, Hicks & Perken (Thermometers) Ltd.	303
Helimatic Ltd.	December
H.R.P. Ltd.	Cover ii
Holmes (Preston) Ltd.	296
Hunt Heat Exchangers Ltd.	February
Hussmann British Refrigeration Ltd.	239
Ice Machinery Mart	291
Imperial Aluminium Co. Ltd. ...	297
Imperial Chemical Industries Ltd. ("Arcton")	February
Imperial Chemical Industries Ltd. (Heavy Organic Chemicals)	February
Imperial Chemical Industries Ltd. (Isocyanates)	February
Imperial Chemical Industries Ltd. (Marston)	224
Imperial Chemical Industries Ltd. (Metals)	February
Imperial Chemical Industries Ltd. (Plastics Division)	237
Imperial and Mining Supplies Co. Ltd.	February
Industrial Components Ltd. ...	302
Insulated Bodies Ltd.	291
Iridon Ltd.	December
Jablo Plastics Industries Ltd.	February
Jackstone Froster Ltd.	Front Cover & 290
" J.D." Insulating Co. Ltd.	February
Junta Nacional Da Cortica ...	240
Keenan (Matthew) & Co. Ltd.	February
Kelvinator Ltd.	February
Lec Refrigeration Ltd.	209
Levin (K.J.) AB	211
Lightfoot Refrigeration Co. Ltd.	December
Lister (R. A.) & Co. Ltd.	February
Loheat Ltd.	305
Marco Refrigerators Ltd. ...	305
Marston Excelsior Ltd.	224
Mercantile Credit Co. Ltd. ...	293
Minikay Ltd.	208
MODERN REFRIGERATION	290 & 306
Monsanto Chemicals Ltd.	February
Nathan's Equipment Ltd. ...	298
Newalls Insulation Co. Ltd.	Cover iii
Notley Ltd.	290
Onazote Insulation Co. Ltd.	February
Patrick (W.) & Son Ltd. ...	291
Perfection Parts Ltd.	304
Pertwee & Back Ltd.	290
Pressed Steel Co. Ltd.	229
Ranco Ltd.	230
Rapid-Ice-Freezing Ltd. ...	290
Refrigeration Appliances Ltd.	February
Refrigeration Journal (The) ...	291
Refrigerator Components Ltd.	February
Reierts (Great Britain) Ltd. ...	228
Scott (David) & Co. Ltd.	January
Searle Manufacturing Co. Ltd....	217
Secura Refrigerated Cabinet Co.	216
Shell Chemical Co. Ltd.	December
Sherwood Engineering Co. Ltd.	February
Siebe, Gorman & Co. Ltd.	November
Silica Gel Ltd.	February
Smithfield Refrigerator Co. Ltd.	231
Smiths Insulations Ltd. ...	December
S. & R. Electronic Products Ltd.	307
S.N. Engineering Co. Ltd. ...	291
Spiral Tube & Components Co. Ltd.	December
Spiro Gills Ltd.	222
Stal Refrigeration AB	February
Sterne (L.) & Co. Ltd. ...	214 & 215
Strommen Engineering Ltd. ...	226
Taylor (W. A.) Ltd.	223
Teddington Refrigeration Controls Ltd.	227
Temperature Ltd. ...	212 & 290
Testo (Wales) Ltd.	243
Thermal Closures & Containers Ltd.	February
Tucker (Geo) Eyelet Co. Ltd. ...	307
Turner Bros. Asbestos Co. Ltd.	304
U.D. Engineering Co. Ltd. ...	234
Union Carbide Ltd. ...	February
Union Cold Storage Co. Ltd.	300
L'Unite Hermetique	282
United Air Coil Ltd. ...	February
United Dominions Trust (Commercial) Ltd.	286
Wallington Jones & Co. Ltd. ...	301
West (Ernest) & Beynon Ltd.	February
Western Ice & Cold Storage Co. Ltd., The	304
White (J. Samuel) & Co. Ltd.	February
Wigglesworth (Frank) & Co. Ltd.	290
Williams (G.) Engineering Co. Ltd.	233
Winget Ltd.	244
Worthington-Simpson Ltd.	February
York Shipley Ltd.	210
Yorkshire Imperial Metals Ltd.	February
Zero Electric Ltd.	285



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